1918-00468

RECORD OF DECISION

FOR THE

PURITY OIL SALES, INC.

SUPERFUND SITE,
GROUNDWATER AND TANKS
OPERABLE UNIT

Prepared by
The U.S. Environmental Protection Agency
Region IX
San Francisco, California

RECORD OF DECISION

FOR THE

PURITY OIL SALES

SUPERFUND SITE,

GROUNDWATER AND TANKS

OPERABLE UNIT

PREPARED BY

THE U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION IX

SAN FRANCISCO, CALIFORNIA

TABLE OF CONTENTS
PURITY RECORD OF DECISION
Groundwater and Tanks Operable Unit

<u>Tables</u>

<u>Figures</u>

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

The Purity Oil Sales (Purity) site is located in Malaga, California, one-half mile south of the City of Fresno, in California's Central Valley.

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the Purity site groundwater and tanks operable unit, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and the National Contingency Plan. This decision is based on the administrative record for this site. (The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based). The State of California has concurred on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision (ROD) for the Purity site includes the following actions to address contaminated groundwater and tanks:

- Water treatment to remove volatile organic compounds (VOCs), iron and manganese from the groundwater, including:
  - Extraction of contaminated groundwater to attain federal and state drinking water standards in the aquifer
  - Treatment of contaminated groundwater using greensand and air stripping. Carbon adsorption will be used to control air emissions, if needed
  - Disposal of treated and tested groundwater by use of one or more of the following methods: reinjection into the aquifer, disposal in the North Central Canal or disposal in local infiltration basins
  - Groundwater monitoring to verify contaminant clean-up
  - Provision of an alternate water supply to affected private well owners located northwest of the site

DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

The 7 acre Purity site is located about one-half mile south of the city limits of Fresno (Figure 1). The site is located in the center of California's San Joaquin Valley. The Purity site operated as a used oil recycling facility from 1934 to the early 1970's.

The site is located in a predominantly industrial area, but has some adjacent residential properties. Properties immediately adjacent to the site include railroad tracks, a scrap metal yard, a residential trailer park, a small market, a propane distributor, a small farm, several residences, and a used auto salvage yard (Figure 2). It is estimated that the auto salvage yard has 72 employees and is visited by 22,000 customers each month. Approximately 180 residents live in the trailer park. The trailer park has about 50 trailers and 10 cabins. Some trailers are located immediately adjacent to the site fence. The small market has a backyard and residential apartment. Immediately southeast of the site are three houses with two or three people living in each house.

Under the Fresno County General Plan, the Purity site is in a zone defined as heavy industrial and is intended to provide for all manufacturing uses, including the heaviest and most intensive types. Fresno County is proposing to create an enterprise zone within the next 15 years, encompassing the Purity site and surrounding land. Future industrial-commercial development around the site could be extensive under this program.

About one-half mile to the west and southwest of the site are fields of oats, alfalfa, cotton, fruit trees, and grapes. The town of Malaga, which has a medium density residential area, surrounds the site at distances of about one-half mile and more.

The Purity Oil site is located in the San Joaquin River drainage basin. The San Joaquin River is approximately 12 miles north of the Purity site. There are no natural watercourses in the vicinity of the Purity site. Several irrigation canals flow in the region, including the North Central Canal along the southern site boundary. The North Central Canal is a lateral of the Central Canal. The Central Canal eventually dead-ends approximately 10 miles from the Purity site and has no outlet to any surface drainage course.

The groundwater aquifer in the Fresno area has been designated as a sole-source aquifer by EPA under the Safe Drinking Water Act. The Fresno sole-source aquifer is bounded by the San Joaquin River to the north, Friant-Kern Canal to the east, Fresno

- Creation of a groundwater management zone extending 1-2 miles from the cleanup target area, to control pumping to maintain groundwater levels at the desired configuration

- Tank Removal

  - Removal and off-site disposal of contaminated wastes in the seven onsite steel tanks

  - Solidification of wastes, if needed, prior to offsite disposal

  - Cleaning, dismantling and off-site disposal of tanks

DECLARATION

The selected remedy is protective of human health and the evironment, attains federal and state requirements that are applicable or relevant and appropriate to this remedial action and is cost-effective. The remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions to the maximum extent practicable.

Because of the anticipated length of time to achieve the cleanup goals, and the uncertainty as to whether the cleanup goals can be achieved, both the technologies and the cleanup goals will be reassessed every 5 years. The State of California has written a letter of concurrence on this ROD.

Daniel W. McGovern 9.26.89

Daniel W. McGovern — Date

Regional Administrator

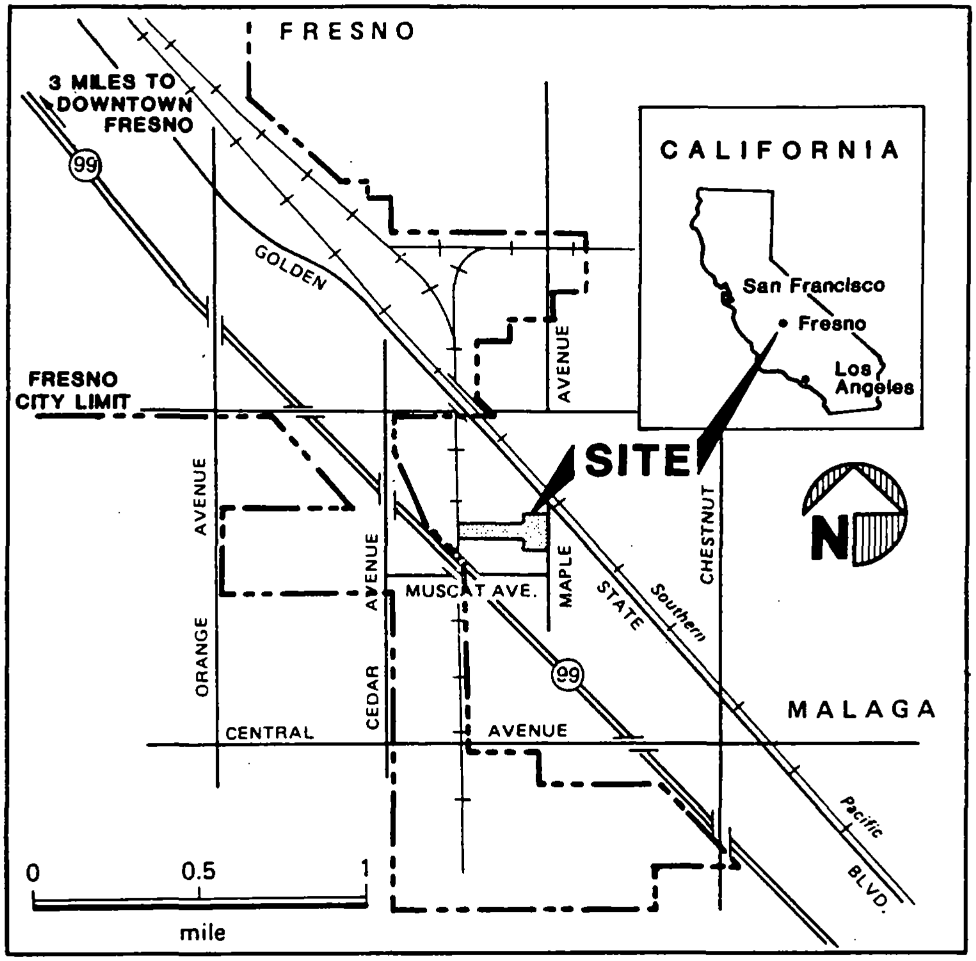


FIGURE 1

SITE LOCATION MAP

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

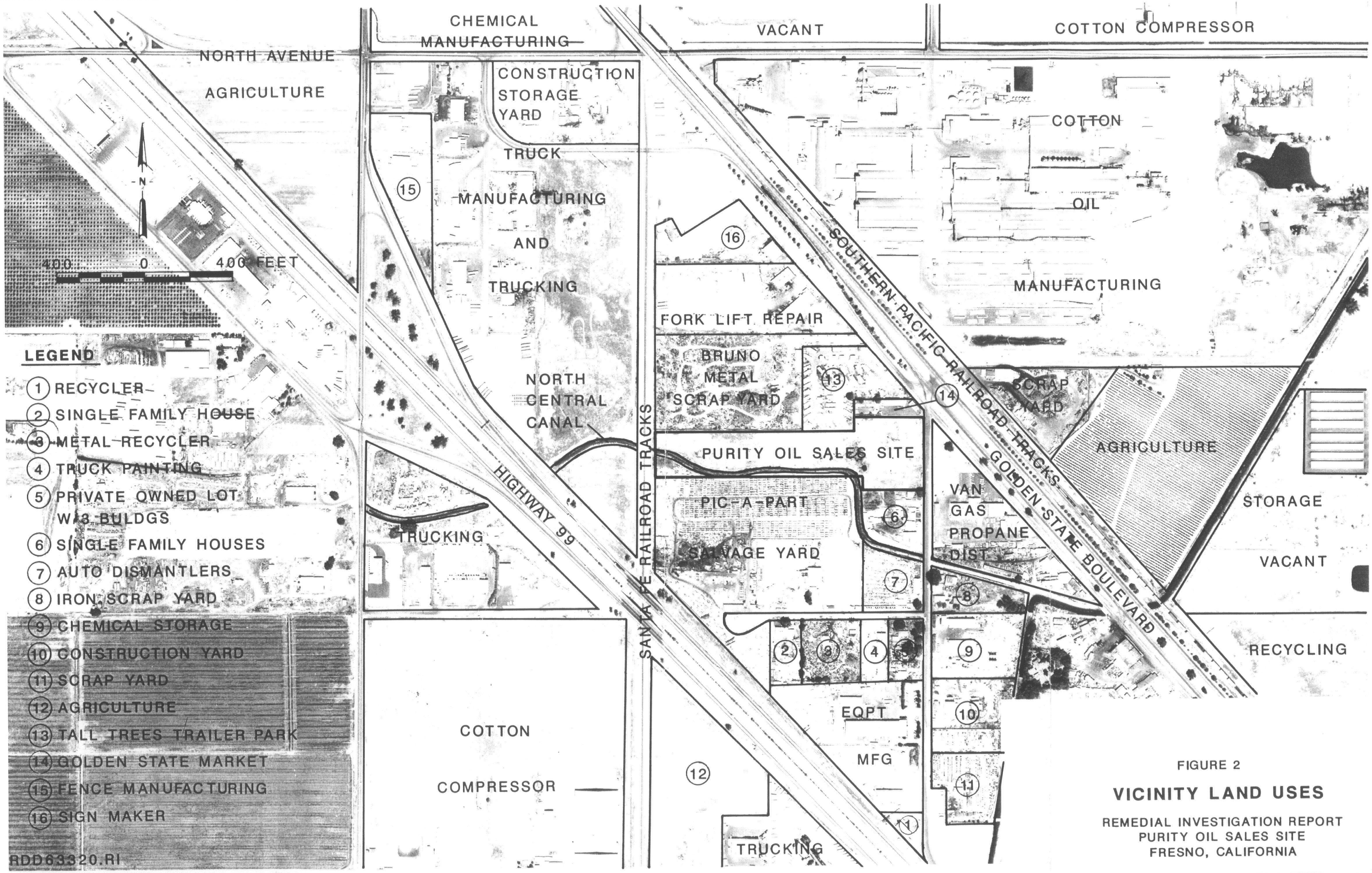


FIGURE 2

VICINITY LAND USES

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

Slough to the west, and the Fresno County line to the south, and includes the Purity site within its boundaries.

The aquifer in the vicinity of the site is unconfined to depths of several hundred feet. Because there is no confining clay zone layer to restrict vertical groundwater flow, the shallow aquifer underlying the Purity site is probably hydrogeologically connected with deeper aquifer zones which provide domestic water supply for the City of Fresno and surrounding area. Depth to groundwater at the site is between 40 and 50 feet. The present direction of groundwater flow is toward Fresno (the northwest).

The Purity site is located in a non-attainment area for the following air quality standards: ozone, CO and PM-10. As individual constituents, the area is attainment for NO_2, SO_2 and HC.

Since the area surrounding the Purity site is primarily industrial, neither the site nor the surrounding areas provide habitat or sustain any rare or endangered species of plant or animal. There are no signs of any significant wildlife or vegetation, or any habitat on the site itself, other than scrub grasses.

Seven steel tanks are present onsite at above-ground locations. The tanks are believed to have been used to store oil prior to reprocessing, and during the acidification process. One of the tanks has an exterior asbestos coating. Waste pits up to ten feet deep cover most of the site, but have been filled since the early 1970's with soil, debris and rubble. The site is mostly flat with the western two-thirds of the site 3-5 feet above the surrounding land due to the presence of the fill material.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Beginning in 1934, used oil was recycled at the Purity site. The used oil was taken to the site from businesses such as service stations, car dealers, truck stops, electrical transformer yards and military facilities. The used oil was refined using a number of treatment processes including clarification, chemical addition, dehydration, distillation and filtration. The oil and by-products from the refining process were collected and stored in sumps and storage tanks and were disposed of onsite in sludge pits. A composite sketch of the approximate locations of the buildings, storage areas, and waste disposal areas from 1942 to 1973 is shown in Figure 3.

The original owners of the recycling facility were William Dickey and Ray Turner, who operated the facility from 1934 to 1948. In 1948, William Siegfried and Robert Hall purchased the site as Paraco Oil, Inc. The site and facilities were sold to

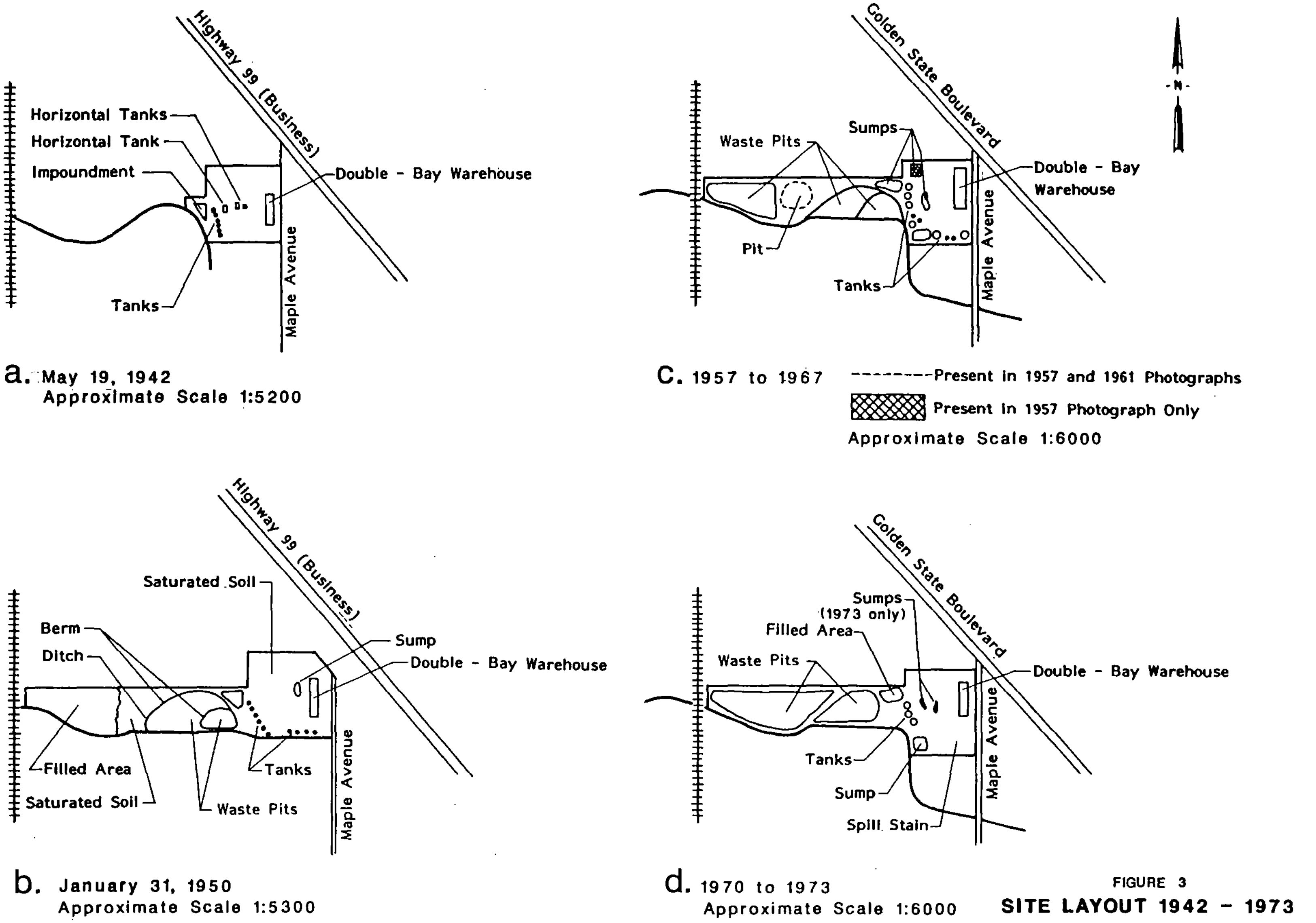


FIGURE 3
SITE LAYOUT 1942 - 1973
REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

REFERENCE: BACKGROUND REPORT, DOHS 1985

RDD63320.RI

Michael Marcus of Purity Oil Sales, Inc., in 1965. In June 1973, Purity Oil began complying with a court order to empty and backfill the waste pits. Although the waste pits were backfilled by January 1975, there is no evidence that the pits were emptied. In January 1974, the maintenance foreman at Purity Oil Sales, Odis Johnson, arranged to purchase the facilities and lease the property from Michael Marcus. In March 1975, Odis Johnson informed the Fresno County Health Department that he was selling the equipment and would not operate the facilities. Also in 1975, Michael Marcus filed for bankruptcy, and the site was held by the State of California for nonpayment of taxes.

A fire at the site in 1976 destroyed the main warehouse building and adjacent equipment. The remaining equipment was removed from the site, and the area was partially regraded. Several steel tanks were all that remained. In 1979, the State of California sold the property to William Enns. In 1980, the Department of Health Services (DHS), informed William Enns of a serious hazardous waste problem on his property and requested a cleanup plan. Enns went to court requesting recession of the sale. In 1982, the recession was granted and the site was returned to the custody of the State of California.

The Central Valley Regional Water Quality Control Board (RWQCB) obtained surface-water samples from the North Central Canal in 1980. One year later, the RWQCB also conducted groundwater sampling from private wells near the site. In February 1982, the EPA Emergency Response Team, DHS, and RWQCB carried out a joint site investigation that included surface and subsurface soil sampling, monitoring well installation, and groundwater sampling. Air quality data were also obtained to monitor the release of vapors during sampling and drilling. This investigation indicated that the onsite soil and groundwater contained volatile organic compounds, semi-volatile organic compounds and inorganic compounds which may pose a threat to human health and the environment. The site was included on the EPA National Priority List in December 1982.

DHS was designated the lead agency for the site and in 1983, retained Harding Lawson Associates (HLA) to perform the Remedial Investigation. Field explorations and chemical testing performed by HLA were completed in September 1984. A Remedial Investigation Report was issued on May 12, 1986. During HLA's Remedial Investigation, the EPA Emergency Response Team removed about 1,800 cubic yards of hazardous oily/tarry materials from the site.

In January 1986, EPA assumed the lead for the site and retained CH2M HILL to expand the Remedial Investigation work performed by HLA to include additional soil and groundwater studies. The purpose of this supplemental work was to complete the evaluation of the nature and extent of the soil and groundwater contamination onsite and in the site vicinity, to characterize pathways of contaminant migration offsite, and to determine risks to human health and the environment from the contaminants. New data were collected to fill gaps in the chemical data for the onsite soils and to provide new information on the nature and extent of the groundwater contamination. The Remedial Investigation (RI) Report prepared by CH2M HILL was submitted to EPA in October 1988. The data collected by CH2M HILL were validated using EPA approved methods. The Public Health Evaluation was issued by EPA in March 1989. EPA released a Feasibility Study in April 1989 to present alternatives for cleaning up the site. The Proposed Plan for the site was circulated for public review and comment period in April 1989, and a public meeting was held April 26.

Currently, renewed efforts are underway to determine whether viable Potentially Responsible Parties (PRP's) exist and who they are. Information requests authorized under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), RCRA § 3007/CERCLA § 104(e), were issued to some PRP's in 1983. Responses were received and a PRP search report was issued in 1985. However, these documents were inconclusive. Based on current investigative work, additional 104(e) letters, general notice letters and special notice letters authorized under CERCLA, will be issued. The special notice letters will require the PRP's to submit a good faith offer to undertake design and construction of the remedial actions prescribed by the ROD.

III. COMMUNITY RELATIONS

The following is a summary of community relations activities required under Sections 113 (k)(2)(i-v) and 117 of CERCLA and conducted by DHS and EPA for the Purity site. All DHS and EPA fact sheets were printed and distributed in Spanish and English. A Spanish interpreter was provided at community meetings.

Date	Activities
August 1983-March 1984	DHS and EPA community relations (CR) representatives conducted community assessment interviews with interested community members in the Malaga area and completed the Community Relations Plan.
March 1984	DHS held a community meeting to discuss site background and health survey results.
August 1984	DHS distributed a fact sheet providing a brief status report on site activities.
April 1987	Information repositories were established.

	Notice was given to site neighbors requesting permission to conduct sampling activities on neighborhood property.
June 1987	EPA distributed a fact sheet detailing site history, the Superfund process, current site activities and opportunities for community involvement.
March 1988	A letter was distributed to the Tall Trees Mobile Home Park residents notifying them of the potential health hazards of trespassing onto the site.
February 1989	EPA distributed a fact sheet detailing the results of the Remedial Investigation.
April 1989	EPA distributed a fact sheet explaining the contents of the Feasibility Study and outlining the Proposed Plan. The upcoming comment period and community meeting were also announced.
April 26, 1989	EPA held a community meeting to explain the Feasibility Study report and to receive public comment on EPA's Proposed Plan for addressing the soil and groundwater contamination at the site.
September 1989	Notice of this ROD, or Final Plan for the groundwater and tanks operable unit, will be published and made available to the public before commencement of the remedial action.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

This groundwater and tanks operable unit (OU) will be supplemented later by a soils operable unit ROD, to ultimately e ~~a~~ffect cleanup of the entire Purity site. The groundwater OU ROD will enable design and cleanup of the contaminated aquifer and removal of the tanks to proceed as quickly as possible. This will reduce the possibility of groundwater contamination spreading, and prevent the continued use of contaminated water by private well owners. Removal of the tanks will eliminate a nuisance and potential health hazard from the site.

Treatability studies will be conducted on the site soils, to determine the effectiveness of several emerging treatment technologies. Following treatability studies, a ROD for the soils OU will be prepared. The soils OU ROD will address the continuing source of groundwater contamination from the site and will therefore augment this groundwater ROD.

V. SITE CHARACTERIZATION

The following section briefly describes soil and groundwater contamination at the Purity site. Although soils cleanup alternatives will not be addressed in this ROD, this section will briefly describe the nature of the soil contamination. This soil information is relevant since the contaminated soils are a source of groundwater contamination, and in order for the proposed groundwater remedy to be effective, the source will need to be remediated.

CONTAMINATED SURFACE SOILS

The contaminated surface soils extend vertically to a depth of approximately two feet and are defined as the eastern 2.5 acres of the site where the plant facility was located. Waste pits were not located in this area. These surface soils are contaminated with organic compounds, pesticides, oil and grease, and a variety of metals. Some of the areas of surface contamination were cleaned up by EPA in 1985, as part of a Removal Action.

The levels of organic compounds in the surface soils are generally below the California Total Threshold Limit Concentrations (TTLC) values for definition as a state hazardous waste. The level of pesticides exceed the California TTLC at one location. All metals except lead were below the California TTLC. Lead concentrations in the surface soils ranged from 330 to 5,680 mg/kg, with only one sample exceeding the California TTLC value of 1,000 mg/kg. Based on testing done to date, the surface soils have not been determined to be Resource Conservation and Recovery Act (RCRA) characteristic or listed wastes.

Risk based cleanup goals for lead, aldrin, dieldrin, heptachlor epoxide, and PCB concentrations in the surface soils were exceeded. These concentrations are presented in Table 1. Additional cleanup goals based on groundwater protection and constituent solubility will be developed in consultation with the Regional Water Quality Control Board and included in the soils ROD.

BURIED WASTES AND CONTAMINATED SUBSURFACE SOILS

The buried wastes and contaminated subsurface soils are located on the western 4.5 acres of the site and contain demolition debris, soil and oily waste pits. The buried wastes are vertically identified as four mixed layers (Layers A, B, C and D). The top two layers (Layers A and B) contain approximately 55,000 cubic yards of material and vary in depth from 2 to 14 feet below the present ground surface. This waste zone contains construction debris, steel pipes, soil and oily sludge. The sludge contains a variety of organic contaminants including

Table 1
SOIL CLEANUP GOALS
PURITY OIL SITE
(mg/kg)

Compound	Maximum Soil Concentration Detected[c]	Average Soil Concentration Detected[c]	Cleanup Goal Established by a 10^{-6} Cancer Risk--Exposure From Ingestion: Maximum Exposure			Most Probable Exposure			Cleanup Goal Established by Reference Dose maximum Allowable Exposure from Ingestion	
			Residental	Occupational	Trespassers	Residential	Occupational	Trespassers	Child[a] Residential	Adult Residential and Occupational
INORGANIC CONSTITUENT										
Barium	1,760.0	125.0	--	--	--	--	--	--	2,500	35,000
Beryllium	1.50	0.307	--	--	--	--	--	--	250	3,500
Cadmium	72.0[d]	4.425	--	--	--	--	--	--	25	350
Chromium	97.0	13.60	--	--	--	--	--	--	250	3,500
Lead	34,000.0	1,348.10	--	--	--	--	--	--	70	980
Mercury	0.90	0.263	--	--	--	--	--	--	100	1,400
Silver	11.0	3.051	--	--	--	--	--	--	150	2,100
Zinc	5,800.0	229.9	--	--	--	--	--	--	10,500	147,000
ORGANICS										
Phenol	50.00	22.00							2,000	28,000
Aldrin	0.100	0.078	0.039	--	--	--	--	--	--	--
Dieldrin	0.35	0.139	0.046	--	--	--	--	--	--	--
Heptachlor Expoxide	1.4	0.187	0.093	--	--	--	--	--	--	--
PCB	11.00	4.045	0.101	0.202	--	1.348	2.022	--	--	--

[a]Based on a 10-kg child ingesting 0.2 g/day of surface soil.
[b]Based on a 70-kg adult ingesting 0.1 g/day of surface soil or deep soil.
[c]Surface samples and shallow borings within the site boundries only.
[d]Single test on HLA boring. Next highest value 17 mg/kg.

RDD/R90/032.50

benzene, toluene, xylene, polyaromatic hydrocarbons, phenols, chlorinated ethenes and ethanes, and chlorobenzene. Lead concentrations exceed the California TTLC value for disposal as a hazardous waste in all onsite borings where oily sludge was encountered. The levels of other constituents detected did not exceed TTLC values.

The bottom two layers (Layers C and D) contain approximately 117,000 cubic yards of materials and vary in depth from approximately 10 to 40 feet below the ground surface. These soils also contain a variety of organic contaminants, but their concentrations decrease rapidly below Layers A and B. Lead concentrations in three samples from the bottom two layers of soils exceeded the California TTLC value.

Based on testing done to date, the buried wastes and subsurface soils have not been determined to be RCRA characteristic or listed waste. Additional testing is being done on these wastes to determine whether they will be RCRA characteristic wastes based on the TCLP test and to determine possible land ban applicability. Lead was the only constituent that exceeded risk based cleanup goals in layers A, B, C, and D for buried wastes. Cleanup goals to protect groundwater quality based on constituent solubility will be developed for buried wastes in consultation with the RWQCB, for the soils ROD.

ONSITE STEEL TANKS

Seven above-ground steel tanks are present onsite at locations shown in Figure 4. Table 2 shows the estimated tank and waste volumes, and Table 3 describes their condition. They contain up to two feet of tar, wood and contaminated soil. One tank has an asbestos coating. Although the tanks are not leaking severely, the steel on all of the tanks is rusting. Slight seepage can be observed from several of the tanks during extended warm weather periods. All tanks contain oily sludge, and in several the oily sludge is combined with soil. No flowable oil or water phases were found in the tanks.

The contaminants identified in the samples taken from the tanks were similar to the contaminants in the buried wastes, although relative values were higher in the tanks for most compounds. Of the inorganic constituents, samples from five tanks (Nos. 1, 3, 5, 6 and 7) exceeded the TTLC values for lead for designation as a state hazardous waste. Lead concentrations in Tanks 5 and 7 exceeded the Extraction Procedure (EP) toxicity value for definition as a RCRA characteristic hazardous waste, as well. Zinc concentrations in Tank No. 4 exceeded the TTLC value.

Of the organics, PCB concentrations above the TTLC value were detected in samples from Tank No. 5. 4,4-DDD levels exceeding

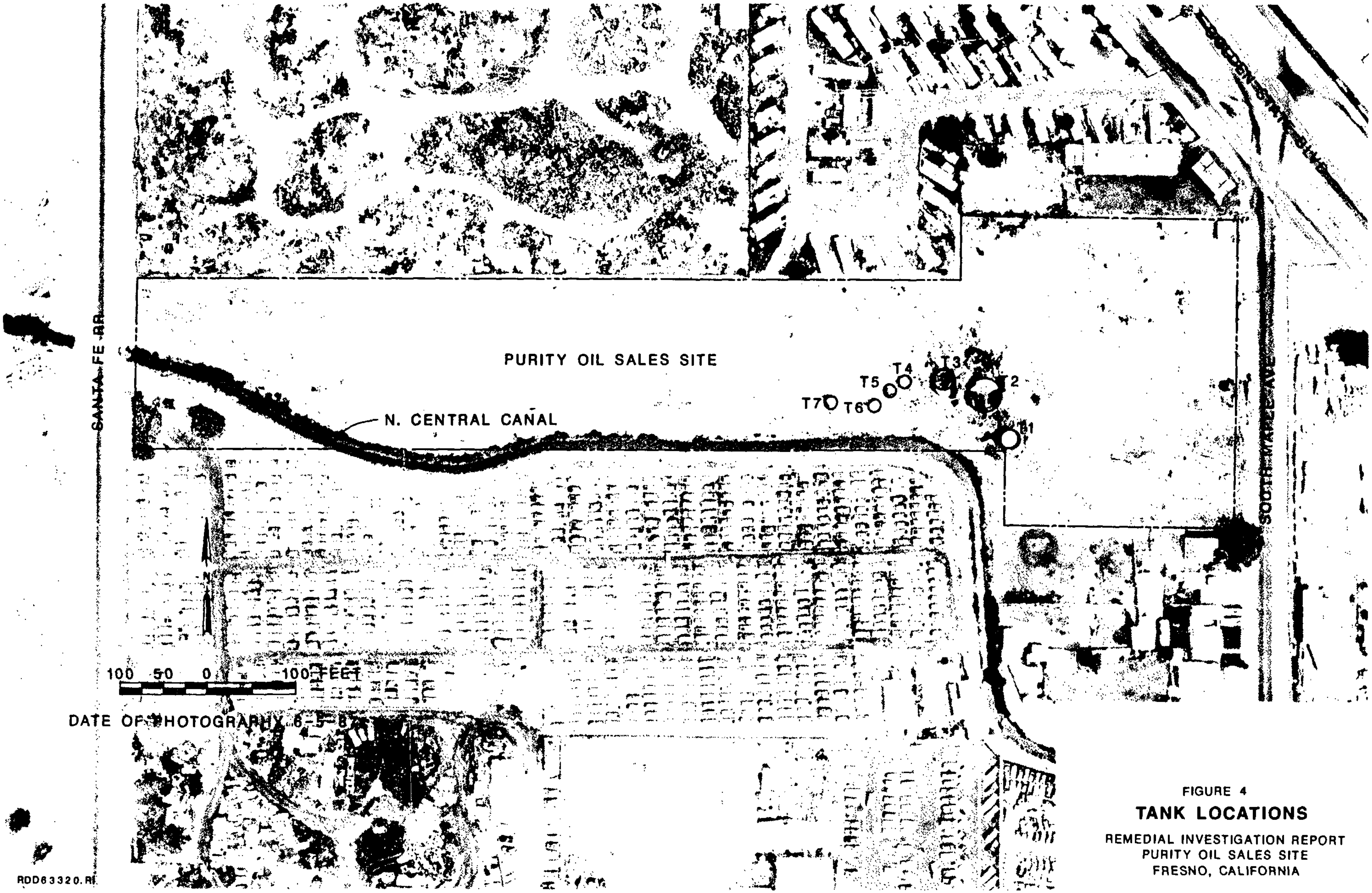


FIGURE 4
TANK LOCATIONS
REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

Table 2
ESTIMATES OF TANK AND WASTE VOLUMES

Steel Tank Area Number	Estimated Tank Volume (gallons)	Estimated Waste Volume (gallons)	Waste Type	Scrap Surface (ft^2)
T1	44,000	2,500	Thick oily sludge	1,440
T2	110,000	9,200	Oily sludge (3,700 gal) Thick sludge (5,500 gal)	2,600
T3	53,000	5,500	Thick sludge	1,660
T4	10,000	2,000	Thick sludge	690
T5	5,000	300	Oily sludge	350
T6	16,000	1,500	Thick sludge	900
T7	11,500	1,500	Oily sludge	700

Table 3
TANK CHARACTERISTICS AND CONDITIONS

Tank Number	Diameter (ft)	Height (ft)	Shape	Construction	Foundation	Top	Condition
T1	22	15	Cylinder	Welded steel	Concrete	Open, no roof	Poor; battered; evidence of leakage
T2	35	15	Cylinder	Welded steel	Concrete	Open, partial wooden roof	Poor; partially collapsed; open hole near base
T3	30	10	Cylinder	Welded steel	Soil	Open, no roof	Poor; partially collapsed
T4	15	8	Square	Riveted steel	Wood	18-inch manhole on top	Poor; exterior coating of fibrous material partially stripped
T5	9	10	Cylinder	Welded steel	(tank on side)	Open	Poor; tank lying on side; hole in bottom
T6	15	17	Cylinder w/ bottom cone	Welded steel	I-beam legs	18-inch access portal	Poor; partial scaffolding; evidence of leakage from bottom port
T7	13	14	Cylinder w/ bottom cone	Welded steel	I-beam legs (tank on side)	18-inch access portal	Poor; tank lying on side; partially collapsed; evidence of sludge loss from top opening

the TTLC value in Tanks No. 2 and 4, were also detected. Risk based cleanup goals were not established for the tanks, since they were assumed to be temporary structures.

NORTH CENTRAL CANAL WATER AND SEDIMENT

Pesticides were detected in sediment samples taken from the North Central Canal near the site, but were below California TTLC values and may be due to local agricultural practices rather than site contamination. Lead concentrations in samples taken from locations along the canal slopes above the water surface ranged from 1,200 mg/kg to 13,200 mg/kg and exceeded the California TTLC. All of the metals concentrations in the canal bottom sediments were below the California TTLC. Existing data indicate the quality of the canal water remains essentially constant for constituents analyzed upstream and downstream of the site. The canal sediments will be remediated along with the site soils and wastes.

GROUNDWATER

The water-bearing sediments in the Fresno area consist of interbedded lenses and layers of materials ranging from clays to gravels. Silty sands, silts and sands are the predominant soil types encountered beneath the site. As previously stated, the groundwater aquifer in the site vicinity is unconfined to depths of several hundred feet and flows in a northwesterly direction, with depth to groundwater between 40-50 feet.

The groundwater beneath the site is contaminated by a variety of organic and inorganic constituents. The contaminated plume extends at least to an irrigation well located approximately 2,800 feet downgradient of the site. It appears likely that the contamination extends between 2,800 and 5,600 feet downgradient of the site, although it is possible that the irrigation well has limited the quantity of contaminants moving past 2,800 feet.

It is estimated that the vertical extent of groundwater contamination extends to depths of 90 to 130 feet. At the downgradient edge of the plume, the vertical extent has not been defined. Additional well installation and sampling is planned for the near future to further define the downgradient edge of the plume. This information will be used during the remedial design phase.

Groundwater contaminants requiring remediation include volatile organic compounds (VOCs), iron and manganese. Total VOC concentrations were detected at levels as high as 620 ppb in the onsite monitoring wells and 14 ppb in downgradient private wells. The volatile contaminants consist primarily of the dichloroethene (DCE) and dichloroethane (DCA) compounds. 1,2-DCA is the most widespread of the VOCs.

No municipal water supplies have been affected thus far by site-related contaminants. 1,2-DCA was detected above the State of California maximum contaminant level (MCL) of 0.5 ppb in several of the downgradient private wells as far as 2,800 feet from the site. The state MCL is considered an ARAR for site remedial action. The federal MCL drinking water standard of 5 ppb was not exceeded in private wells. Table 4 indicates which constituents detected in the groundwater exceeded federal and/or state standards and action levels. These standards and action levels are the cleanup goals for the site. Figures 5 and 6 show results from rounds 1, 2 and 3 of VOC sampling.

Naturally occurring iron and manganese appear to be going into solution and contaminating the groundwater beneath the site. This is due to the acidic nature of the site wastes and the reducing environment beneath the site. These contaminants were detected at concentrations greater than secondary MCLs in three rounds of sampling, as shown in Figures 6, 7 and 8.

In general, the pH of groundwater upgradient and downgradient of the site is greater than it is beneath the site. The average pH upgradient and downgradient of the site was greater than 7.0, but beneath the site it was generally less than 7.0. A pH of 6.0 was detected in several of the shallow onsite wells.

The Purity Oil site is located in the northwest corner of the Malaga County Water District and is served by District water supplies. The private wells and municipal wells in the site area are shown in Figure 9. The Malaga and Calwa County Water Districts have domestic water supply wells located to the southeast, east and northeast of the site. These wells are not downgradient of the site and do not appear to influence groundwater flow at the site. The depth of these municipal wells ranges from 200 to 500 feet.

The nearest downgradient City of Fresno municipal well (Well PW40) is located approximately one and three quarter miles northwest of the site. Analyses conducted during October 1984 and June 1988 did not show site-related contamination in this well. The Fresno city well is approximately 500 feet deep.

A number of properties in an area west and north of the site (downgradient) are not supplied with municipal water. Unless water is imported, privately owned wells are the sole source of water in this area. Some of these wells have been affected by contaminants from the Purity site. The majority of these private wells are used by service-related industries, that do not use large volumes of water for processing. Most private wells in the vicinity of the site are screened to depths of 60 to 160 feet. An irrigation well located at the corner of North Avenue and Cedar Avenue (Well PW39 on Figure 9) probably pumps the most water of any of the production wells near the site.

Table 4
Contaminants Exceeding
Groundwater Cleanup Goals*
(in parts per billion)

Compound	Maximum Concentration Detected	Federal MCL's Primary	Federal MCL's Secondary	State Action Levels Toxicity	State Action Levels Taste & Odor	State MCL's
Inorganics						
Iron	1,540		300			
Manganese	2,520		50			
Volatile Organics						
Trichloroethylene	8	5				5
1,2-Dichloroethane	8	5				.5
1,1-Dichloroethane	53			5		
1,1-Dichloroethene	12	7				6
Benzene	16.9	5				1
Vinyl Chloride	3	2				.5
Carbon Tetrachloride	13	5				.5
Cis-1,2-DCE	220	70 (proposed)		6		
Trans-1,2-DCE	19	100 (proposed)		10		

* Based on additional sampling conducted during remedial design and any changes to standards/action levels, information in this table is subject to change. Contaminants may need to be added or deleted or clean up goals revised.

Goals cited from "Region IX EPA Drinking Water Standards and Health Advisory Table" (EPA. Drinking Water Branch. June, 1989).

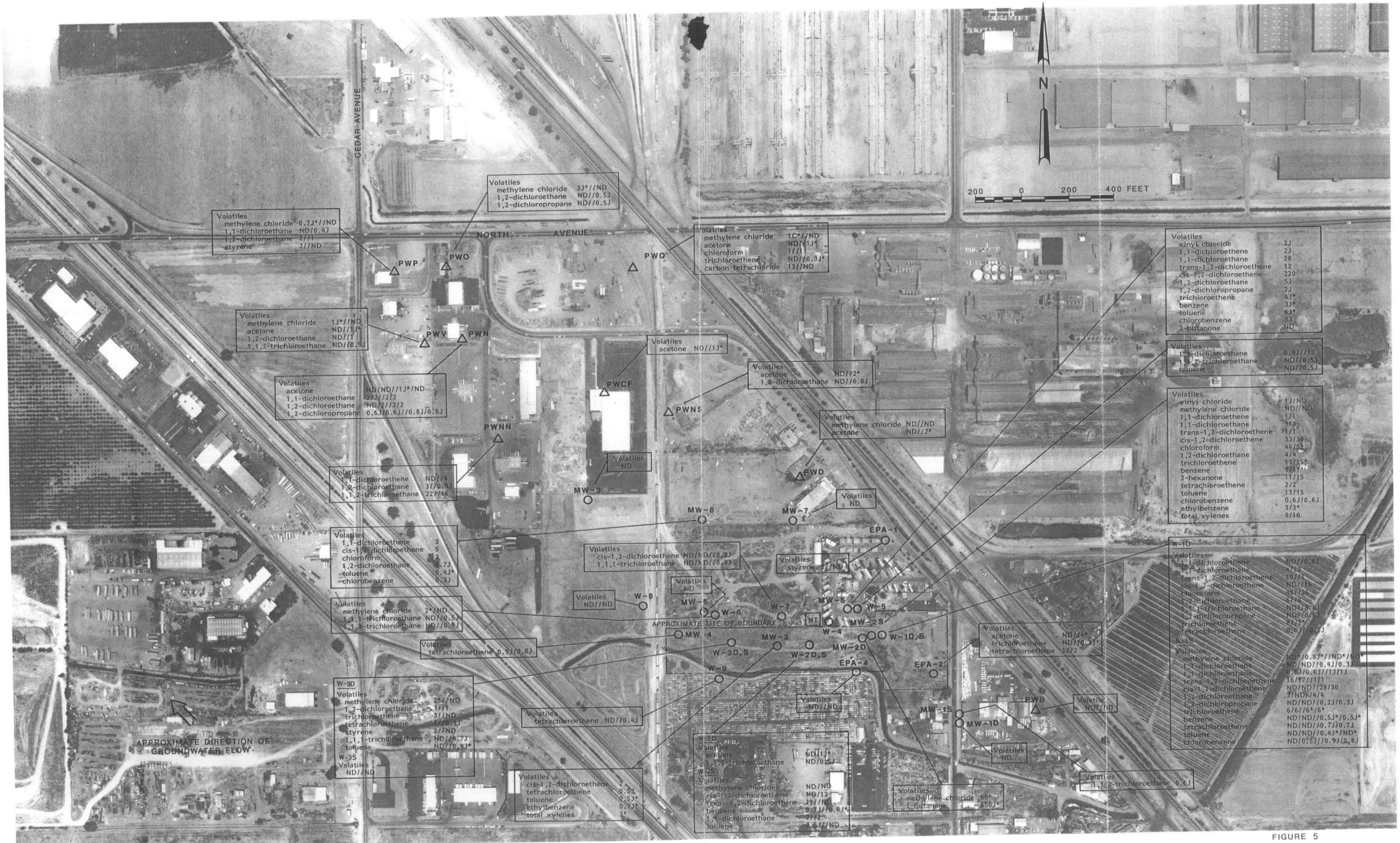


FIGURE 5

ROUNDS 1 AND 2 CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS

(MICROGRAMS PER LITER)
REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

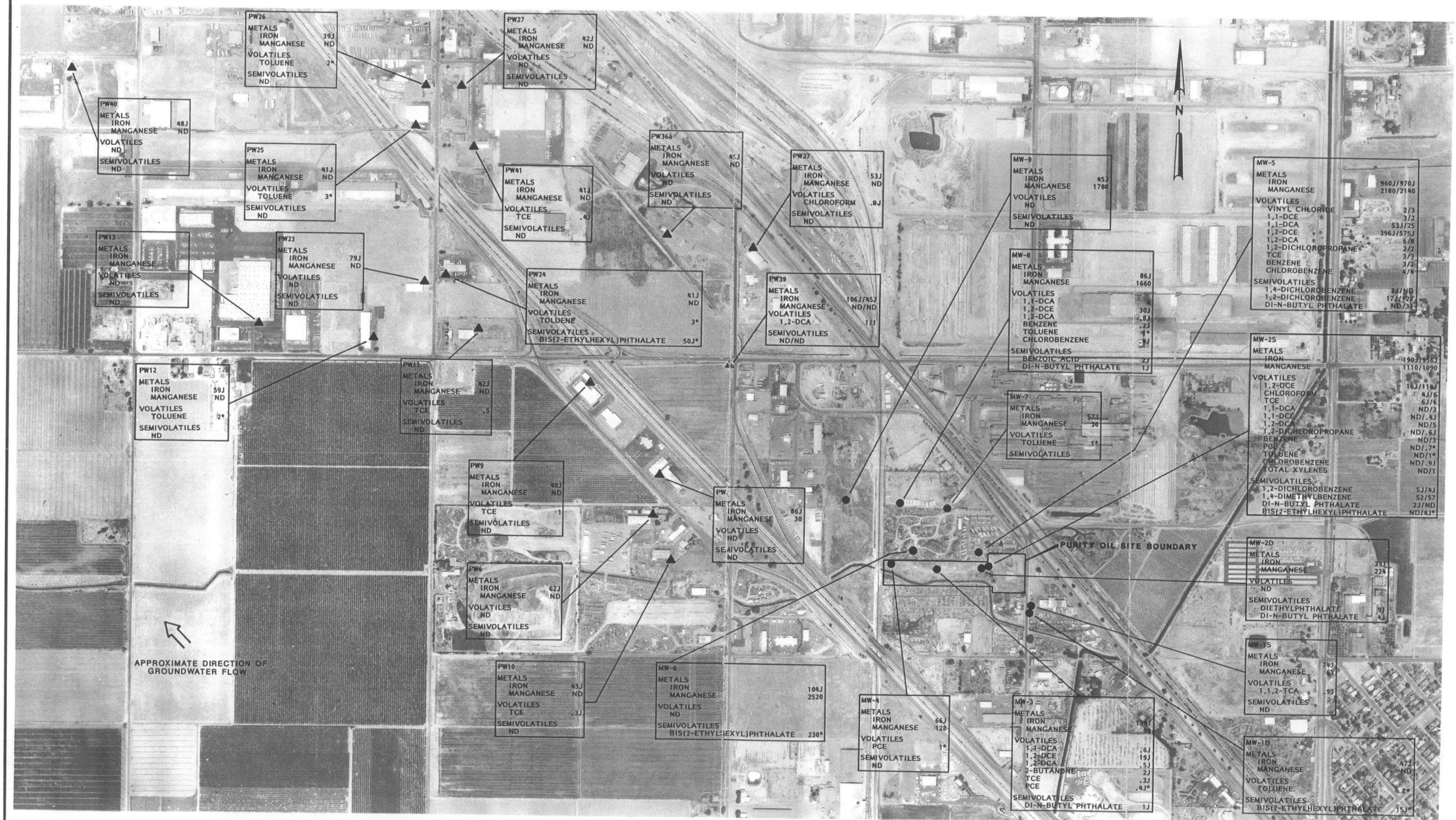
LEGEND

- ○ MONITORING WELL SAMPLING LOCATION
- △ PRIVATE WELL SAMPLING LOCATION
- ⚹ CHEMICAL CONSTITUENTS DETECTED IN THE SAMPLE BLANKS

NT	NOT TESTED
J	INDICATES AN ESTIMATED VALUE, VALID FOR QUALITATIVE USE ONLY DUE TO PRECISION, CALIBRATION, OR HOLDING TIME PROBLEMS
ND	NOT DETECTED
XX//XX	INDICATES JUNE 1987 SAMPLING RESULTS //DECEMBER 1987 SAMPLING RESULTS
XX/XX	INDICATES DUPLICATE SAMPLING RESULTS

NOTE: MONITORING WELLS WITH MW PREFIX WERE SAMPLED DURING DECEMBER 1987 SAMPLING ONLY

RDD63320.RI



LEGEND

- ● MONITORING WELL SAMPLING LOCATION
- ▲ PRIVATE WELL SAMPLING LOCATION
- ✳ CHEMICAL CONSTITUENTS DETECTED IN THE SAMPLE BLANKS
- UNITS IN ug/l

J INDICATES AN ESTIMATED VALUE, VALID FOR QUALITATIVE USE ONLY DUE TO PRECISION, CALIBRATION OR HOLDING TIME PROBLEMS

ND NOT DETECTED

XX/XX INDICATES DUPLICATE SAMPLING RESULTS

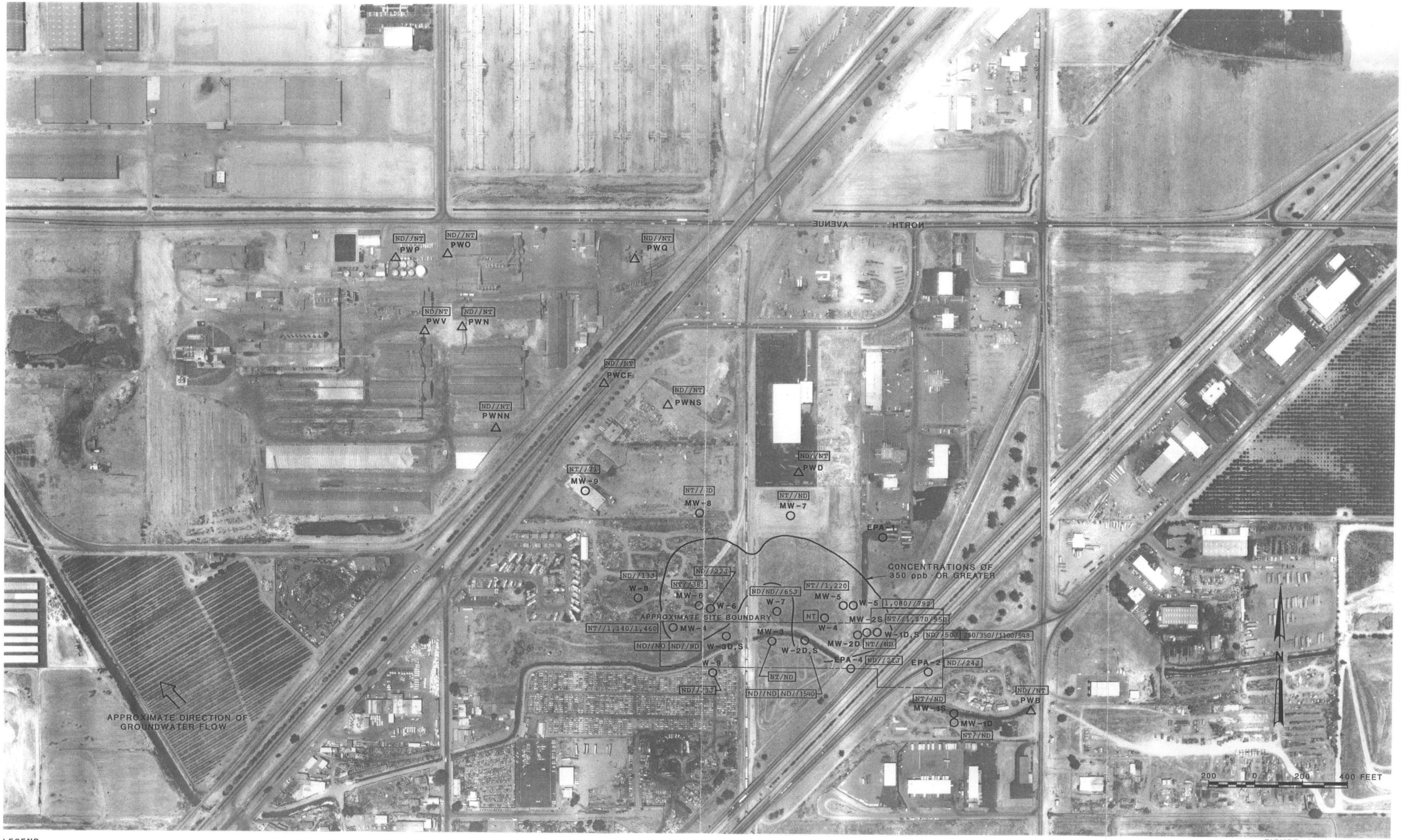
0 400 800 FEET

RDD63320.RF PHOTOGRAPHY: MAY 15, 1985

FIGURE 6

GROUNDWATER SAMPLING RESULTS ROUND 3, JUNE 1988 VOLATILES, SEMIVOLATILES, IRON AND MANGANESE

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA



LEGEND

○ MONITORING WELL SAMPLING LOCATION

△ PRIVATE WELL SAMPLING LOCATION

⚹ CHEMICAL CONSTITUENTS DETECTED IN THE SAMPLE BLANKS

NT NOT TESTED

J INDICATES AN ESTIMATED VALUE, VALID FOR QUALITATIVE USE ONLY DUE TO PRECISION, CALIBRATION, OR HOLDING TIME PROBLEMS

ND NOT DETECTED

XX//XX INDICATES JUNE 1987 SAMPLING RESULTS //DECEMBER 1987 SAMPLING RESULTS

XX/XX INDICATES DUPLICATE SAMPLING RESULTS

NOTE: MONITORING WELLS WITH MW PREFIX WERE SAMPLED DURING DECEMBER 1987 SAMPLING ONLY

FIGURE 7

ROUNDS 1 AND 2
CONCENTRATIONS OF IRON
(MICROGRAMS PER LITER)

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

RDD63320.RI

LEGEND

○ MONITORING WELL SAMPLING LOCATION

△ PRIVATE WELL SAMPLING LOCATION

✶ CHEMICAL CONSTITUENTS DETECTED IN THE SAMPLE BLANKS

NT NOT TESTED

J INDICATES AN ESTIMATED VALUE, VALID FOR QUALITATIVE USE ONLY DUE TO PRECISION, CALIBRATION, OR HOLDING TIME PROBLEMS

ND NOT DETECTED

XX//XX INDICATES JUNE 1987 SAMPLING RESULTS //DECEMBER 1987 SAMPLING RESULTS

XX/XX INDICATES DUPLICATE SAMPLING RESULTS

NOTE: MONITORING WELLS WITH MW PREFIX WERE SAMPLED DURING DECEMBER 1987 SAMPLING ONLY

RDD63320.RI

FIGURE 8

ROUNDS 1 AND 2 CONCENTRATIONS OF MANGANESE

(MICROGRAMS PER LITER)

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

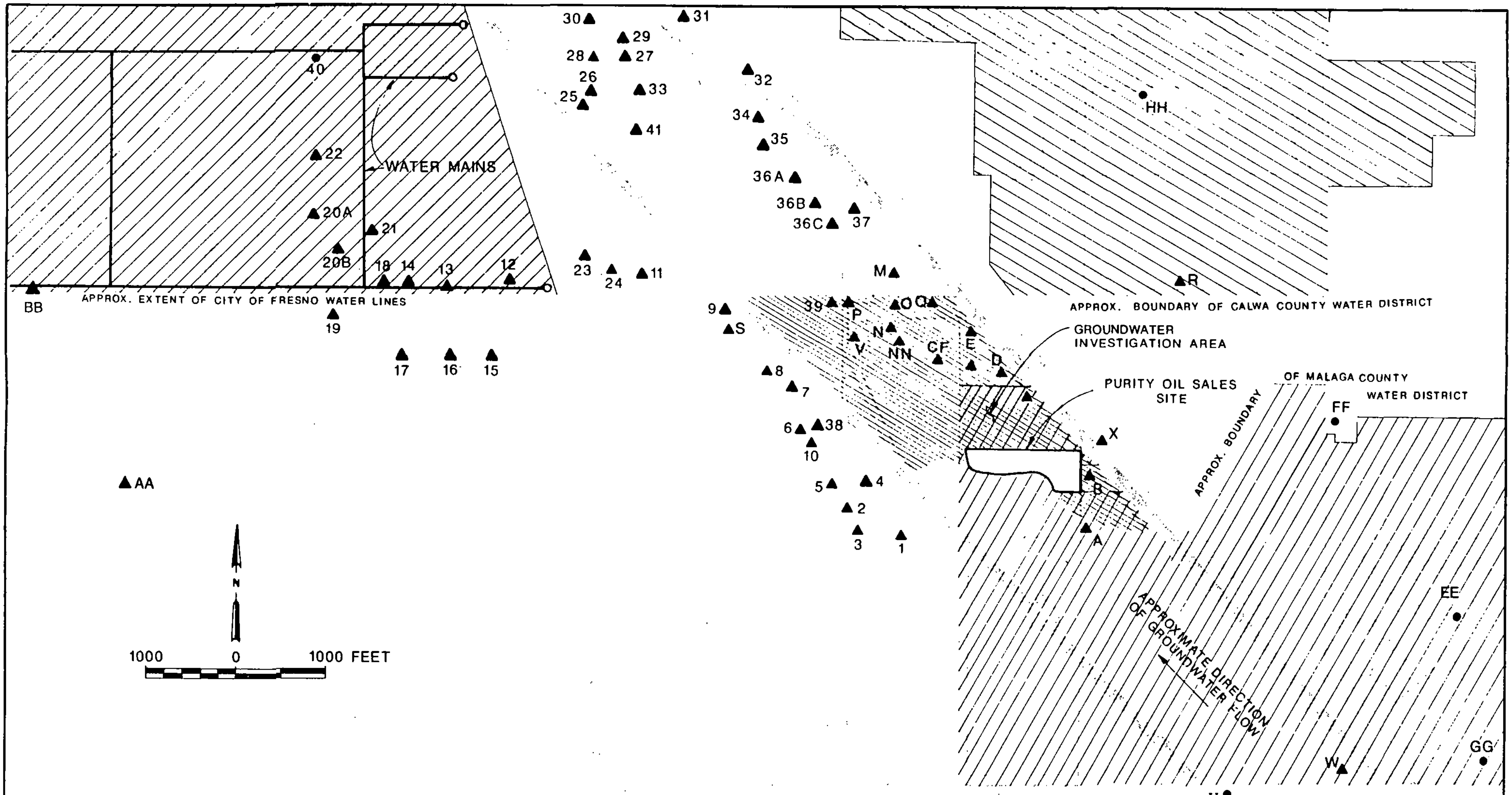


FIGURE 9

OFFSITE GROUNDWATER INVESTIGATION AREA AND LOCATIONS OF PRIVATE AND MUNICIPAL WELLS

REMEDIAL INVESTIGATION REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

LEGEND

▲ PRIVATE WELLS

● MUNICIPAL WELLS

RDD63320.RI

AIR

No exceedances of federal or state ambient air quality standards for site related constituents were detected at the Purity site as long as the surface of the site remained undisturbed. When surface-waste seeps were disturbed or subsurface wastes were exposed, elevated levels of atmospheric contaminants were emitted. The contaminants emitted when wastes were exposed included compounds such as benzene and sulfer dioxide which could result in potential adverse health effects. Additional air quality analysis will be conducted for the soils operable unit remedy.

VI. RISK ASSESSMENT SUMMARY

A baseline risk assessment was prepared for the Purity site that identified and evaluated potential human health and environmental threats if no remedial action were taken.

CHEMICALS OF CONCERN

The contamination at Purity consists mainly of volatile chlorinated hydrocarbons. Semivolatile organics, pesticides, and high levels of metals have also been detected. The particular chemicals of concern identified in the risk assessment are listed in Table 5. The toxicity profiles of the chemicals of concern are included in the Public Health Evaluation (CH2M Hill, 1989).

Acute toxic effects of 1,2-Dichloroethane, the primary groundwater contaminant include central nervous system depression, lung irritation, and injury to liver, kidney and adrenals. Deaths in humans exposed to high levels of 1,2-DCA by ingestion or inhalation may result from circulatory and respiratory failure. Chronic exposure can cause liver degeneration and kidney damage in laboratory animals. Eye damage has been observed in dogs injected with 1,2-DCA. Repeated exposures have been associated with anorexia, nausea, liver and kidney dysfunction and neurological disorders in workers. 1,2-DCA is carcinogenic in mice and rats exposed orally. It is mutagenic in some tests in bacteria, barley and fruit flies.

EXPOSURE PATHWAYS

The exposure pathways of concern that were evaluated for potential health risks can be divided into four major categories:

- o Contaminated groundwater use by downgradient residents or workers (both current and future)

Table 5

CONTAMINANTS OF CONCERN AT THE PURITY OIL SITE

Acetone	Mercury
Aldrin	4-Methyl-2-pentanone
Antimony	2-Methyl phenol
Arsenic	4-Methyl phenol
Barium	Napthalene
Benzene	N-nitrosodiphenylamine
Benzoic acid	PAHs[a]
Beryllium	PCBs[b]
Beta-BHC	Phenol
Bis (2-ethylhexyl) phthalate	Selenium
2-Butanone	Silver
Cadmium	Styrene
Carbon disulfide	Tetrachloroethene
Carbon tetrachloride	Toluene
Chlorobenzene	1,1,1-Trichloroethane
Chloroform	1,1,2-Trichloroethane
Chromium	Trichloroethene
Cyanide	Vanadium
4,4-DDD	Vinyl chloride
4,4-DDE	Xylenes
4,4-DDT	Zinc
Di-n-butyl phthalate	
1,1-Dichloroethane	
1,1-Dichloroethene	
1,2-Dichloroethane	
Dieldrin	
Diethyl phthalate	
Endosulfan	
Ethylbenzene	
Gamma-BHC (Lindane)	
Heptachlor	
Heptachlor epoxide	
Lead	
Methylene chloride	
N-nitrosodiphenylamine	

[a]PAHs which are considered carcinogenic are assessed as a group (Benzo[a]anthracene, Benzo[k]fluoranthene and Chrysene).

[b]PCBs are assessed as a group (Arochlor 1248, Aroclor 1254, Aroclor 1260).

- Direct contact with contaminated site soils by trespassers and future onsite workers or residents

- Direct contact with contaminated canal water and sediments by trespassers, farm workers, and irrigation district workers

- Inhalation of site dusts by current near-site residents or workers, and future onsite residents or workers

RISK CHARACTERIZATION

From these exposure pathways, the following conclusions were reached regarding potential health issues:

- For adults and children exposed to noncarcinogens in the groundwater, the reference dose (the exposure level that would not be expected to cause adverse effects when exposure occurs for a significant portion of the life-span) is not exceeded for any contaminant.

- For residential and occupational groundwater users, excess cancer risks ranged from 8×10^{-8} to 4×10^{-4} for the worst-case exposure and 2×10^{-8} to 8×10^{-5} for the most probable exposure. (EPA selects site remedies from within a 10^{-4} to 10^{-7} risk range, with a general goal of achieving a 10^{-6} level of protection).

- For adult and child residents, and occupational workers, direct contact with surface soils, canal sediments and buried wastes exceeds the reference dose for lead under the worst-case exposure scenario.

- For residential and occupational exposure to these contaminated soils, the excess cancer risks range from 1×10^{-6} to 7×10^{-5} for the worst-case exposure, and 6×10^{-8} to 4×10^{-6} for the most probable exposure.

- For residential and occupational site users, no reference dose was exceeded for exposure to noncarcinogens via inhalation. Adult residential exposure cancer risks ranged from 2×10^{-9} to 2×10^{-5} for the worst case, and from 3×10^{-10} to 4×10^{-6} for most probable case. For occupational exposure the cancer risk ranged from 8×10^{-10} to 4×10^{-6} for the worst case, and from 8×10^{-11} to 6×10^{-7} for the most probable case.

The two major public health concerns associated with the no-action alternative are the presence of a complete groundwater exposure pathway which could bring residents or local workers into contact with contaminants released from the site; and the potential for adverse health effects if people (especially children) come into contact with lead-contaminated onsite soil and canal sediment.

VII. CHANGES TO THE PROPOSED PLAN

The Proposed Plan for groundwater was for a seven extraction well system capable of pumping 700 gallons per minute (gpm). The intent of the original plan was to aggressively cleanup the plume area that exceeded the federal MCL of 5 ppb for 1,2-DCA, and contain the plume area that had lower contaminant concentrations.

The remedy selected for this ROD is a 10 extraction well system capable of pumping 1,450 gpm. This change was made because the state recently promulgated an enforceable MCL standard for 1,2 DCA of .5 ppb which was identified as an ARAR for the site. In order to meet this ARAR, the plume area requiring cleanup was expanded. The selected remedy will be the most cost-effective and efficient alternative in meeting ARARs and protecting public health.

The Proposed Plan for soils involved treatment of 55,000 cubic yards of soil followed by redisposal onsite and capping. The specific treatment method to be used was to be based on the results of treatability studies. Due to policy and guidance developments that encourage completion of treatability studies prior to remedy selection, remedy selection for the Purity site soils will not be made in this ROD. Treatability studies are currently being initiated. Results should be available in mid-1990, after which time a soils ROD will be prepared. Additional opportunity for public comment and review of treatability study data will be provided prior to issuance of the soils ROD.

VIII. GROUNDWATER ALTERNATIVES

The following section briefly describes the alternatives that were considered for groundwater cleanup. Alternative W3 is the selected remedy.

The groundwater alternatives are described in the Feasibility Study in terms of two general areas of contamination: 1) the groundwater beneath and immediately downgradient of the site (defined as the MCL target area), and 2) groundwater in the MCL area plus groundwater in the private well area extending approximately 800 feet north of North Avenue (defined as the State action level (SAL) area). These areas are depicted in Figure 10. This definition of target areas was originally designed before the state action level for 1,2-DCA was replaced by a state MCL. Therefore, these two areas will now be described as the federal MCL area and the state MCL area.

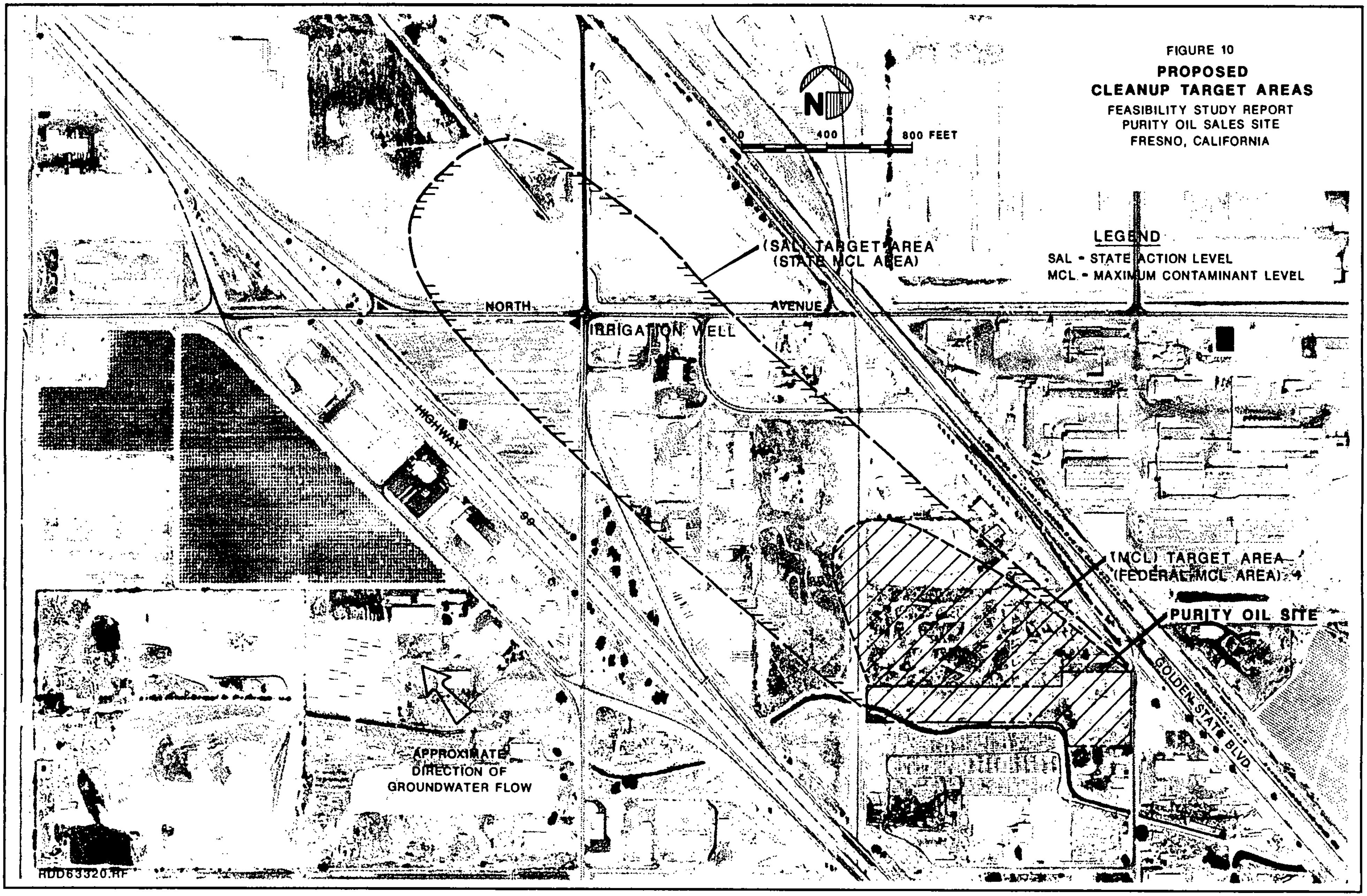


FIGURE 10
PROPOSED
CLEANUP TARGET AREAS
FEASIBILITY STUDY REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA
0
400
800 FEET
LEGEND
SAL - STATE ACTION LEVEL
MCL - MAXIMUM CONTAMINANT LEVEL
(SAL) TARGET AREA
(STATE MCL AREA)
NORTH
AVENUE
IRRIGATION WELL
HIGHWAY
99
(MCL) TARGET AREA
(FEDERAL MCL AREA)
PURITY OIL SITE
GOLDEN STATE BLVD.
APPROXIMATE
DIRECTION OF
GROUNDWATER FLOW
RDD63320.RF

ALTERNATIVE W1--NO ACTION

The existing groundwater conditions would not be remediated. This alternative is used as a baseline for comparison to other alternatives and would have the same health effects as those described in the Public Health Evaluation. The cost for this alternative would be zero.

ALTERNATIVES W2 and W3--GROUNDWATER EXTRACTION; ONSITE TREATMENT; DISPOSAL

Remedial actions under both Alternatives W2 and W3 would include the following:

- Groundwater extraction
- Onsite treatment
- Disposal of treated water
- Alternate water supply
- Institutional controls

Under alternative W2, it is estimated that six extraction wells would pump 450 gpm of groundwater from the federal MCL area to the site, for removal of organic contaminants, iron and manganese. For W3, it is estimated that ten wells will pump 1,450 gpm. These pumping rates and the number of wells where estimated for the Feasibility Study (FS) based on available data, and could be higher or lower depending on results of the remedial design and on existing conditions when extraction wells are installed and tested.

Using the FS estimates, under W2 one extraction well would pump 250 gpm, three wells would pump 50 gpm, and two wells would pump 25 gpm. For W3, five wells will pump 250 gpm, three wells will pump 50 gpm and two wells will pump 25 gpm. The approximate extraction well locations for W2 and W3 are shown in Figures 11 and 12 respectively. The final design criteria, pumping rates and location of the wells will be determined during remedial design.

In both cases, treated groundwater would either be discharged to the North Central Canal, reinjected into the groundwater with injection wells, or discharged to offsite infiltration basins.

Under both alternatives, the groundwater treatment processes at the site include flow equalization, greensand, air stripping and possibly vapor-phase carbon adsorption. Air stripping would be used to remove all of the volatile organic compounds (VOCs) detected at the site. A vapor-phase granular activated carbon system would be used to remove VOCs released

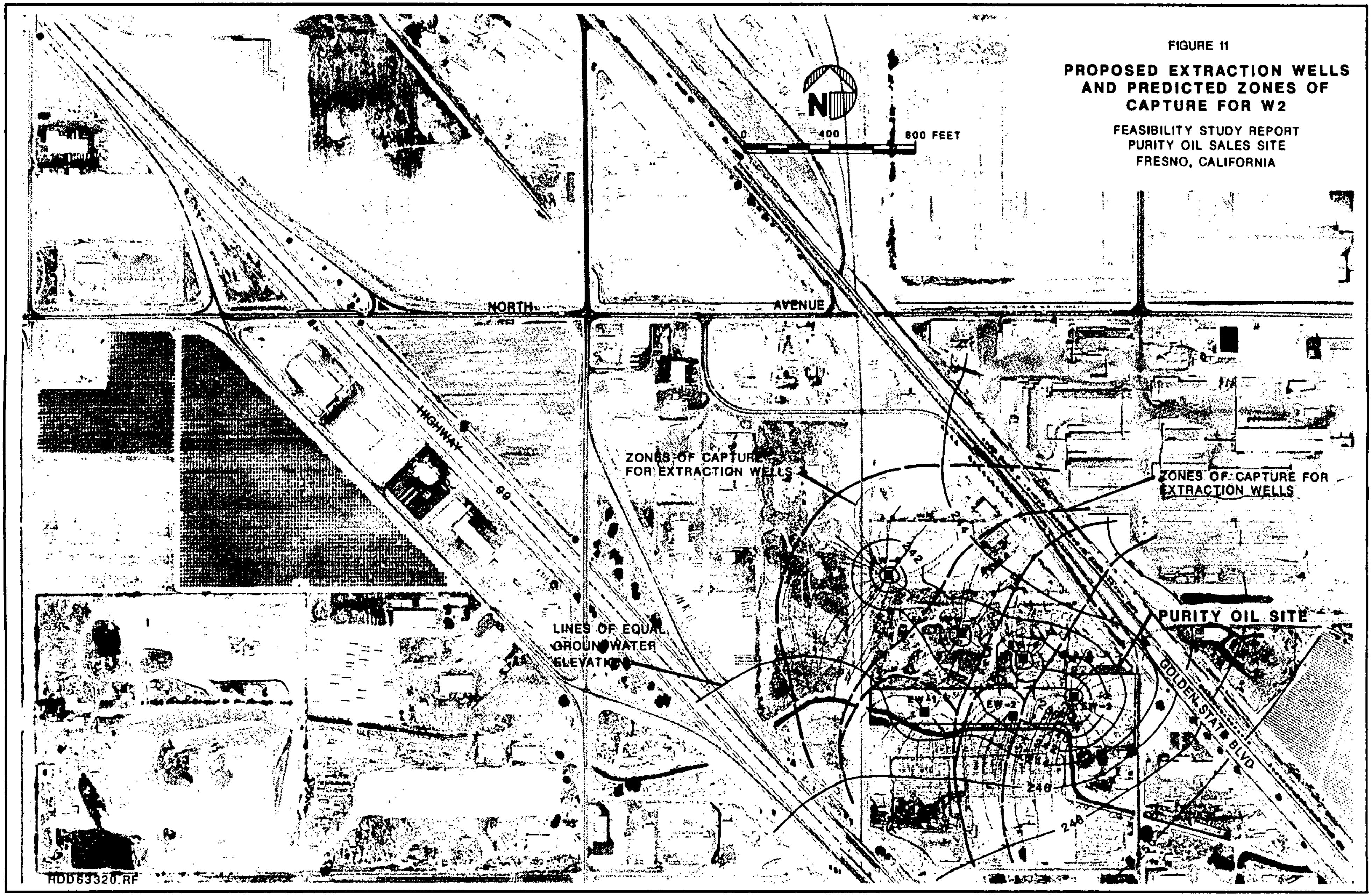


FIGURE 11
PROPOSED EXTRACTION WELLS AND PREDICTED ZONES OF CAPTURE FOR W2
FEASIBILITY STUDY REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA
0
400
800 FEET
N
NORTH
AVENUE
HIGHWAY
99
ZONES OF CAPTURE FOR EXTRACTION WELLS
ZONES OF CAPTURE FOR EXTRACTION WELLS
LINES OF EQUAL GROUNDWATER ELEVATION
242
246
248
EW-1
EW-2
EW-3
PURITY OIL SITE
GOLDEN STATE BLVD
RDD63320.RF

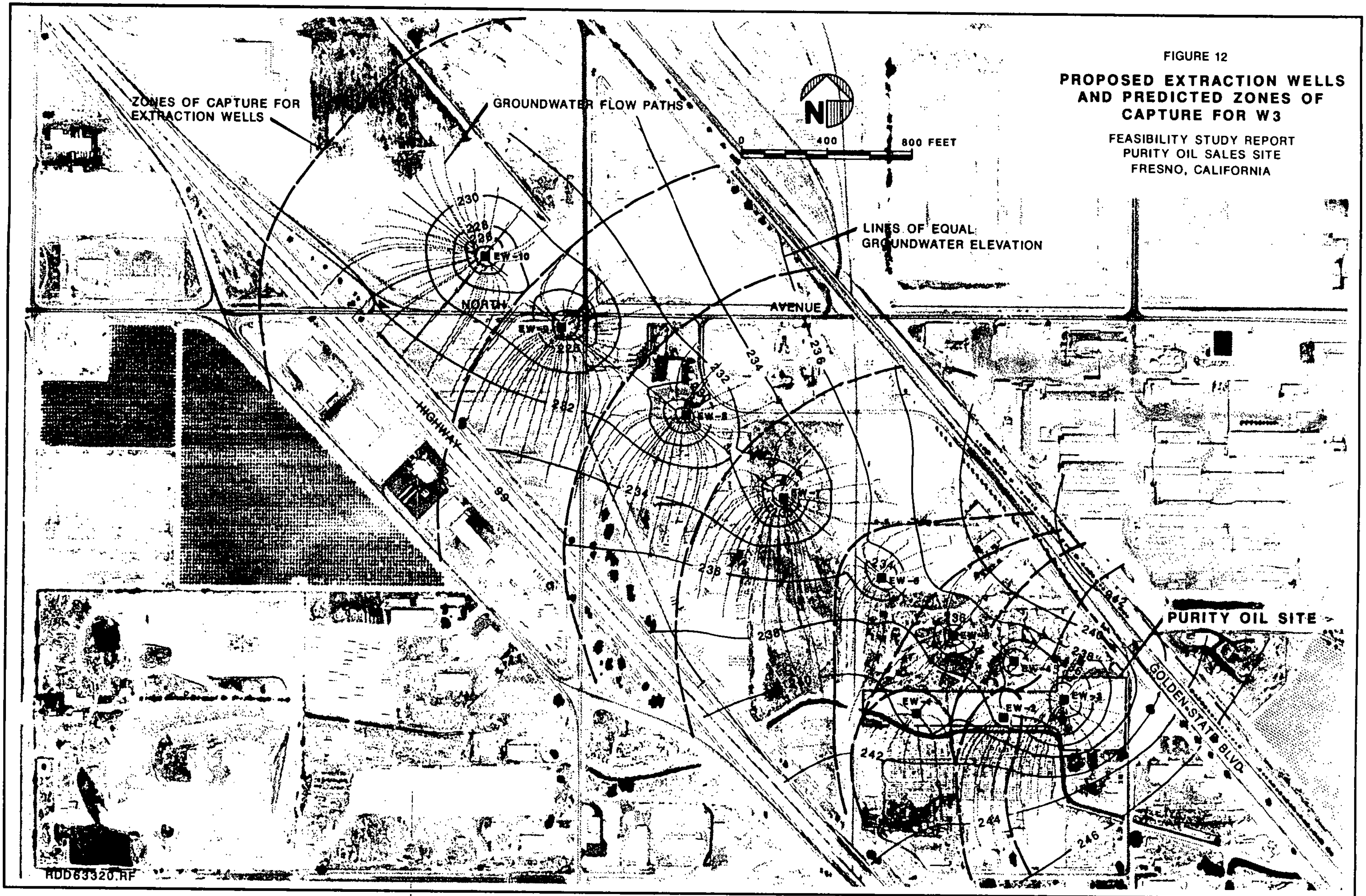


FIGURE 12
PROPOSED EXTRACTION WELLS
AND PREDICTED ZONES OF
CAPTURE FOR W3
FEASIBILITY STUDY REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA
ZONES OF CAPTURE FOR
EXTRACTION WELLS
GROUNDWATER FLOW PATHS
LINES OF EQUAL
GROUNDWATER ELEVATION
0
400
800 FEET
N
NORTH
AVENUE
HIGHWAY
99
PURITY OIL SITE
GOLDEN STATE BLVD.
EW-10
EW-9
EW-8
EW-7
EW-6
EW-5
EW-4
EW-3
EW-2
EW-1
226
228
230
232
234
236
238
240
242
244
246
RDD63320.RF

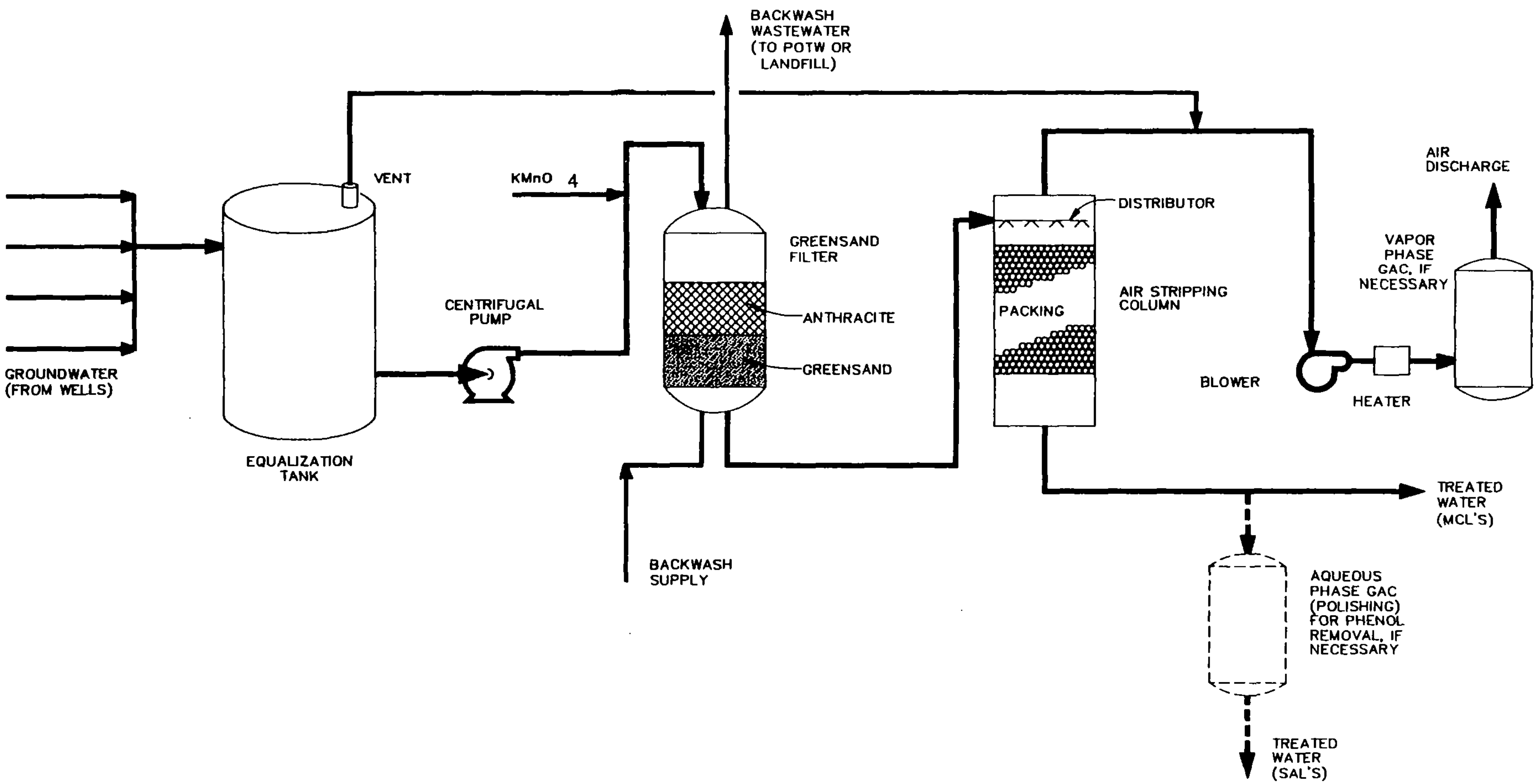
in the stripping tower, if needed to meet emissions requirements. A flow diagram of the treatment process is shown in Figure 13. Groundwater extraction and treatment might continue for 10 to 20 years, under both options.

The greensand filtration process would be used to remove iron and manganese. This process removes iron and manganese by adding potassium permanganate that oxidizes the soluble iron and manganese to an insoluble state and removes the precipitate by filtration. A downflow pressure filter would be used. Based on a conceptual evaluation of the system, three filters may be required for Alternative W2. Each filter would have a diameter of 7 feet and would be 10 feet high. For W3, two rectangular filters would be required, each 8 feet by 20 feet and would be 10 feet high. In both cases, the filter beds would be 5 to 6 feet deep. The filters would be backwashed once per week at arate of 15 gpm for W2 and 45 gpm for W3. The backwash water would be discharged to a public waste water treatment plant, disposed of offsite or placed in onsite evaporation basins.

The air stripping tower for W2 would have a diameter of 5 feet and a packing height of 12 feet. For W3, the tower diameter would be 10 feet with a packing height of 16 feet. Only one unit would be required in each case. The loading rate on the stripping tower would be approximately two pounds of VOCs per day for W2 and 8 pounds for W3. The air from the stripping tower may be discharged to a vapor-phase carbon adsorption unit, for capture of the VOCs. For W2, one carbon adsorption unit having a 10-foot diameter would be required. The unit would require 17,600 pounds of carbon each year. For W3, three units, each having a 10-foot diameter, would be required and would use 64,300 pounds of carbon per year.The carbon unit would be used if necessary to meet air quality standards and the EPA air stripper policy.

The need for carbon filtration will be determined based on additional ambient air quality and meteorological data gathered during design, and subsequent modelling efforts. If needed, the carbon system would be designed for temporary use at startup until meteorological and emission conditions can be monitored. Coordination with the EPA Air Management Division and the Fresno Air Pollution Control District will take place on this issue.

These groundwater treatment processes do not remove phenol. State action levels for phenol are based on aesthetics and are established for the purpose of controlling taste and odor in chlorinated water supplies. Existing groundwater data indicate the possible presence of phenol, but the data are inconclusive as to the existence, extent and source of the contamination. Removal of phenol would require that a liquid-



RDD63320.RF

FIGURE 13

WATER TREATMENT PROCESS DIAGRAM

FEASIBILITY STUDY REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA

phase activated carbon process be added to the alternatives. Further groundwater sampling will be performed to better define the extent of the phenol contamination before including the activated carbon in the groundwater treatment process. Removal of phenol from the treated water may be needed to meet state Waste Discharge Requirements, depending on the final disposal option selected. The cost of adding an activated carbon process to remove phenol was included in the cost sensitivity analysis in Chapter 4 of the Feasibility Study.

The treated groundwater would either be discharged to the North Central Canal at a location adjacent to the site, reinjected into the groundwater by injection wells, or discharged to infiltration basins. Discharge to the North Central Canal would require construction of a short outfall pipe to the canal. Reinjection of the groundwater would require approximately four reinjection wells for Alternative W2 and 10 wells for W3. The depths of the wells would be approximately 100 feet, or deeper. The exact location, number and pumping rates of the wells will be determined during remedial design. Discharge to infiltration basins would require approximately 7 acres of land for W2 and 23 acres for W3. Sufficient land is available within approximately 0.5 to 1 mile of the site for construction of the infiltration basins. The specific disposal option(s) selected will be based on technical, regulatory and cost criteria and will be made in consultation with state and local agencies. As part of the disposal of treated water, recharge to the local aquifer will be maximized as much as possible.

For both W2 and W3, an alternate water supply would be provided for the water users located in the area northwest of the site, east of Highway 99, and south of North Avenue. The Malaga County Water District serves the area immediately north of the Purity Oil site, and connection to its system would be technically feasible. Use of individual carbon filtration systems for each well and bottled water would also be investigated, in lieu of an underground water pipe system.

Groundwater monitoring and institutional controls would be implemented for either alternative. Approximately three additional monitoring wells would be installed in the vicinity of the site for W2 and 12 for W3. The exact location of the wells would be established during remedial design. Approximately 20 monitoring wells would be sampled quarterly for indicator constituents for W2 and 40 for W3, with a more extensive suite of contaminants tested for annually. A groundwater management zone would be created to control pumping to maintain groundwater levels at the desired configuration. Creation of the groundwater management zone will be one of the first tasks during remedial design. Prior to initiation of remedial action, the management zone must be in place to ensure that the remedial action will be effective.

IMPLEMENTATION ELEMENTS FOR ALTERNATIVE W3

The following discussion provides more detailed information on project elements for the selected alternative, W3, that were briefly described in the previous sections.

Monitoring Requirements for W3

When remedial design begins, 1- to 2-week pilot pumping tests will be conducted on several of the monitoring and/or private wells. Based on these tests, the number, locations, and pumping rates of the extraction wells will be selected.

The effectiveness of the remedial action in creating a hydraulic zone of capture will be demonstrated by monitoring the water levels in strategically located wells. The existing monitoring wells and private wells may assist in defining the hydraulic zone of capture, but it will be necessary to construct additional wells to demonstrate the system's effectiveness.

After the new monitoring wells have been installed, monitoring of the groundwater quality and hydraulic capture zone will be necessary. If the data show that the hydraulic capture zone is insufficient, additional extraction wells may have to be installed or the pumping rates adjusted. Also, prior to implementing the extraction alternative, additional monitoring wells will be installed near the private wells north of North Avenue to better define the extent of contamination in this area.

It is difficult to forecast the total number of additional monitoring wells that will be required for monitoring the extraction well field. For the purpose of estimating costs, it was assumed that a total of 12 additional monitoring wells will be required for W3. Some of the 12 monitoring wells might be installed as part of the planned additional investigation of the downgradient extent of the plume.

Potential locations for these monitoring wells are shown in Figure 14. The monitoring well locations will be chosen at critical points to allow monitoring of the hydraulic gradient toward the well field and to determine if contaminants between wells are migrating toward the wells. The likely areas for the development of stagnation points are between the extraction wells. The long-term operation of the well field will likely be based on maintaining the hydraulic gradient toward the well field.

Groundwater levels will be monitored frequently, at least weekly during startup and monthly thereafter. At least 60 wells will be monitored for groundwater levels under W3. Groundwater quality can be monitored less frequently. For the purpose of estimating costs, it is assumed that indicator

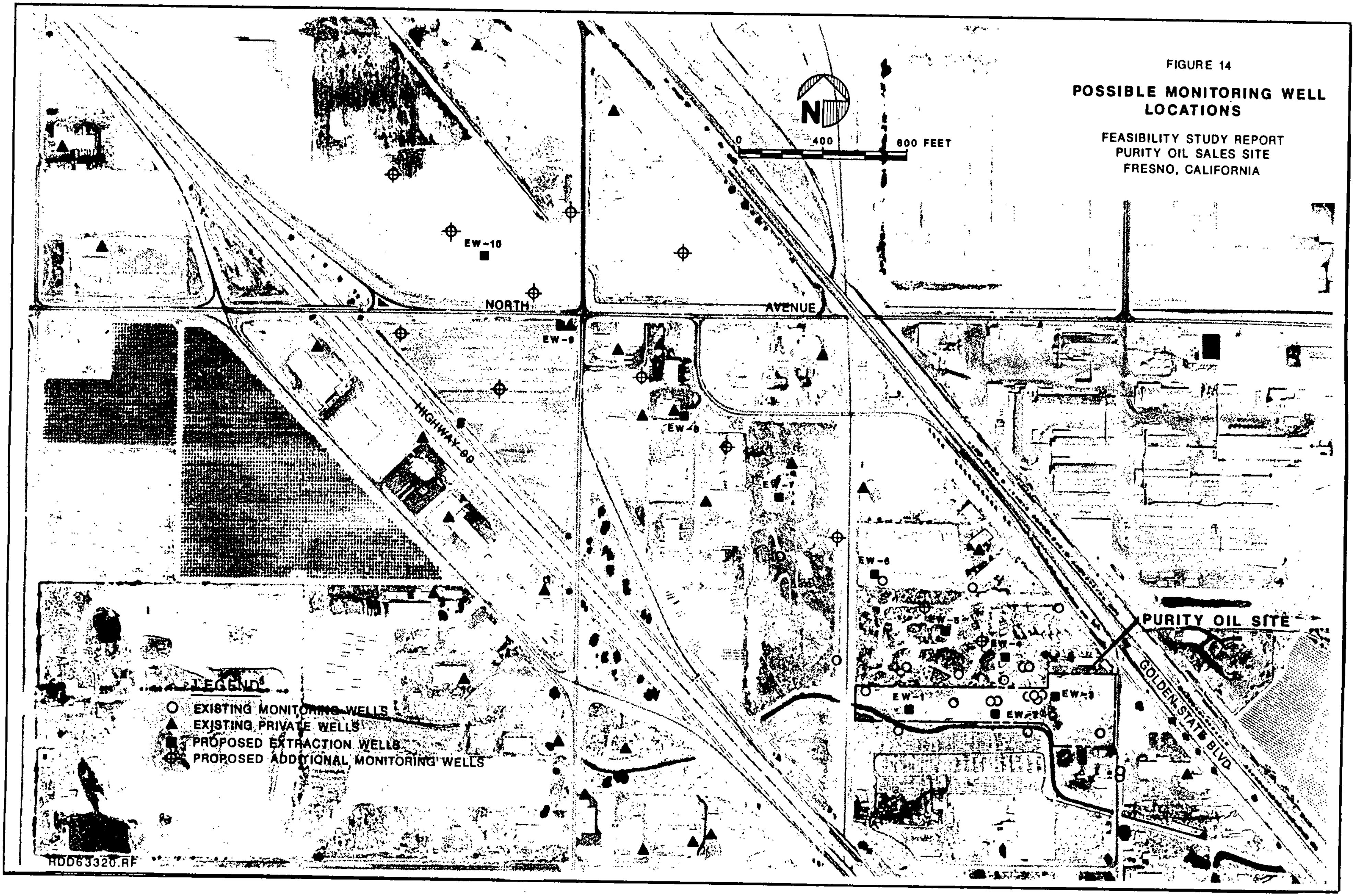


FIGURE 14
POSSIBLE MONITORING WELL LOCATIONS
FEASIBILITY STUDY REPORT
PURITY OIL SALES SITE
FRESNO, CALIFORNIA
0
400
800 FEET
N
NORTH
AVENUE
HIGHWAY 99
GOLDEN STATE BLVD
PURITY OIL SITE
EW-10
EW-9
EW-8
EW-7
EW-6
EW-5
EW-4
EW-3
EW-2
EW-1
LEGEND
EXISTING MONITORING WELLS
EXISTING PRIVATE WELLS
PROPOSED EXTRACTION WELLS
PROPOSED ADDITIONAL MONITORING WELLS
HDD63320.RF

constituents will be analyzed quarterly, with a more extensive suite of constituents analyzed annually. It was assumed that 40 wells will be monitored for water quality under W3. The extraction wells can be shut off sequentially if the monitoring data indicate that levels of contamination have been reduced to below the cleanup goals. Monitoring should be performed at least one year after the system is shut off to see if contaminant levels increase as a result of changing groundwater levels.

Once the offsite contamination has been reduced to levels established by EPA and the state, an assessment will be made to determine if the site is still a source of groundwater contamination. This will require additional field investigations including groundwater and soil sampling. If the site continues to be a source of groundwater contamination, a source control pumping alternative will be implemented until the concentration of contaminants discharging from the site is reduced to levels established by EPA and the state. However, remediation of site soils should prevent this from happening.

Coordination Requirements for W3

The groundwater cleanup will involve management of the groundwater levels to allow collection of contaminants and flushing of the aquifer. A properly controlled and monitored system of wells can effectively contain contaminants. However, if uncontrolled pumping of nearby large wells (such as the irrigation well) were allowed to occur, the effectiveness of the remedial actions may be seriously reduced. Therefore, management of groundwater levels must include provisions for managing and controlling the groundwater conditions in the nearby area. This may include creation of a groundwater management zone that would extend some distance (1 to 2 miles) from the cleanup area. Within such a management zone, pumping would be controlled to maintain groundwater levels at the desired configuration. Such control would include large municipal and private wells in addition to aquifer remediation wells that may be installed at other nearby hazardous waste sites. It will also be important to coordinate disposal of the discharge water with the local water agencies both before and during project implementation.

Groundwater Disposal Alternatives for W3

Three alternatives have been identified for disposing of treated groundwater from the Purity Oil site: 1) discharge to the Fresno Irrigation District's (FID) canal located adjacent to the site, 2) discharge to infiltration basins, and 3) reinjection of treated groundwater into the same aquifer it is being extracted from. Each alternative has different implementation requirements and costs.

Extraction of the groundwater for W3 will require disposal of approximately 1,450 gpm of treated groundwater. The three groundwater disposal alternatives are discussed below.

1. <u>Disposal in North Central Canal</u>

In this disposal alternative, the groundwater would be treated and discharged to the North Central Canal at a location near the Purity site. From the Purity site, the canal flows in a westerly direction for approximately 5 miles before discharging into the Central Canal. The Central Canal eventually dead-ends approximately 10 miles from the Purity site and has no outlet to any surface drainage course. The maximum flow in the North Central Canal during the irrigation season is approximately 26 cubic feet per second (cfs). The volume of treated groundwater discharged to the canal would be approximately 3 cfs, resulting in a dilution ratio of 9:1. Preliminary discussions with the FID indicate that they preferred the canal to be dry during nonirrigation months (generally November through February) to reduce weed and algae growth and allow for maintenance of the canal. However, maintenance of the canal might still be possible if treated groundwater is discharged to the canal during the nonirrigation season. Additional discussion with the FID will be needed to address canal maintenance.

An infiltration test was performed in the canal prior to the 1988 irrigation season as part of the remedial investigation. The test results indicated the infiltration rate is 0.038 gpm/foot of canal length or less, adjacent to the site. Based on an infiltration rate of 0.038 gpm and a groundwater discharge rate of 1,450 gpm (W3), it is likely that all of the treated groundwater would infiltrate into the North Central Canal and the Central Canal during the nonirrigation season. During the irrigation season the treated groundwater would be used to irrigate cropland. Prior to implementing this alternative, the California Regional Water Quality Control Board will issue Waste Discharge Requirements which would specify the quality of water that can be placed in the canal and would include monitoring requirements.

2. <u>Disposal in Infiltration Basins</u>

In this alternative, the treated groundwater would be discharged to infiltration basins located in the site vicinity, managed by the Fresno Metropolitan Flood Control District. In the Fresno area, approximately 70 to 100 feet of water per year can be delivered to infiltration basins. Based on groundwater extraction and a treatment rate of 1,450 gpm, 20 acres of land would be required for this alternative. The infiltration area would be divided into two separate basins to permit periodic maintenance. Excavation to approximately 4 feet would provide capacity for all the treated water and some freeboard.

Treated groundwater would be pumped from the treatment facilities to the infiltration basins. Under the above extraction rate, the land requirements would dictate that the infiltration basins be located on agricultural land away from the site. Land may be available through the Fresno Metropolitan Flood Control District, within approximately 1 mile both west and south of the site. A pipeline would be constructed from the site to the basin. Waste Discharge Requirements, including monitoring provisions, would be required from the RWQCB. Coordination with the Flood Control District regarding their concerns and requirements would be needed during the design phase.

3. Disposal in Injection Wells

In this alternative treated groundwater would be injected into the same aquifer from which it was extracted. For purposes of the Feasibility Study, it was assumed that the wells would be within 1,000 feet of the site to minimize piping costs. No specific locations were identified. Injection well placement would need to be designed to not adversely affect, and possibly to enhance, the zone of capture for the extraction well system. If reinjection is selected as a groundwater disposal option, the size and location of the wells will need to be determined during remedial design.

Based on groundwater extraction and treatment at a rate of 1,450 gpm, it was estimated that up to 10 injection wells would be needed. The injection wells would be gravel packed and screened in a manner similar to a domestic water supply well. The diameter of the injection wells would be at least 12 inches, and the depth of the wells would be approximately 100 feet or deeper. The quality of the reinjected water would have to meet federal and state drinking water standards. Reinjection wells would need to comply with the RWQCB's Waste Discharge Requirements, consistent with the Basin Plan water quality objectives.

IX. TANK REMOVAL ALTERNATIVES

In the Feasibility Study, two alternatives were presented for tank cleanup. In one alternative, the contaminated wastes in the seven onsite steel tanks would be removed from the tanks and transported to a RCRA landfill for disposal. The waste would be removed using a backhoe or a crane with a bucket and placed in 55-gallon drums. Solidification of a portion of the wastes may be necessary. The seven tanks would be scraped by hand to remove any remaining loose, tarry sludge. The asbestos coating on Tank 5 would be removed and packaged for offsite disposal. The steel tanks would be dismantled and transported to an approved offsite landfill or scrap yard. This is the selected remedy for tank cleanup.

In the other alternative, if site soils were going to be treated or contained on-site, the contaminated wastes in the tanks would be removed, stored onsite in drums and treated or contained with contaminated soils. The seven tanks would then be handled as in the 1st alternative.

Since a soil remedy is not being selected in this ROD, the tank wastes will be disposed of at an appropriate off-site facility rather than be drummed on-site. This will avoid on-site storage of hazardous waste until remediation of site soils is undertaken.

X. ARARS ANALYSIS

A detailed analysis and discussion of the identified ARARs for the groundwater and tank alternatives is presented in Table 6. It should be noted that for the most part only the substantive requirements of ARARs apply to onsite actions and onsite is defined to be the areal extent of contamination and all suitable areas in reasonable proximity to the contamination necessary for implementation of the response action, rather than the legal property boundaries of the site.

XI. COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD evaluates the performance of the alternatives in relation to: short-term effectiveness; long-term effectiveness; reduction of toxicity, mobility and volume; implementability; ARARs; cost; overall protection of public health, and; state and community acceptance. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another to identify key tradeoffs.

SHORT-TERM EFFECTIVENESS

Alternatives W2 and W3 would provide similar protection to the community and the workers during construction. Alternative W2 would require approximately 20 months to construct, and Alternative W3 would require approximately 24 months. Each of the alternatives would require groundwater treatment for approximately 10 to 20 years.

Alternatives W2 and W3 would have similar minor short-term environmental impacts which could be mitigated. These impacts entail noise, dust and traffic disruption commonly associated with similar construction projects. These impacts would not be significant and could be mitigated to minimize disruption.

The short-term construction impacts of tank removal would be similar whether the wastes were stored on-site or disposed of offsite. Short-term impacts of off-site disposal include

Table 6
ARARs ANALYSIS
GROUNDWATER ALTERNATIVES AND TANK REMOVAL

REMOVAL--GROUNDWATER

Extraction

Action	Comments
I. Cal. Water Code o §§ 13750-13755	Reporting requirements for well construction, alteration or abandonment under the water code are relevant and appropriate for extraction wells due to the technical value of the report information. Reports are filed with the Department of Water Resources.
II. Fresno County Well Construction Ordinance o 470-A-39	This Ordinance governs well construction in Fresno County, and is applicable to extraction well construction, alteration or abandonment.
III. Safe Drinking Water Act (SDWA) o 42 U.S.C. § 300(f) et seq o 40 C.F.R. § 142	The primary maximum contaminant levels (MCLs) of the SDWA are relevant and appropriate requirements as aquifer cleanup goals since the groundwater is a potential source of drinking water, whether or not it is considered a "community" supply.
IV. California Safe Drinking Water Act o Cal. Health and Safety code § 4010-4037 o Cal. Admin. Code, title 22 §§ 64401 et seq	This Act provides for primacy of California with federal SDWA and requires California to set maximum contaminant levels equal to or more stringent than federal. California MCL's are relevant and appropriate requirements as aquifer cleanup goals.
V. Department of Health Services (DHS) Action Levels for Public Drinking Water Supplies (Jan. 1987)	Health-based numeric guidelines set by DHS for the protection of public drinking water supplies through nonpromulgated standards are the levels at which DHS requires water purveyors to take corrective action. These guidelines are to be considered as cleanup goals for the aquifer.

TREATMENT--GROUNDWATER

Air Stripping

Action	Comments
I. Resource Conservation and Recovery Act as amended (RCRA) o 42 U.S.C. § 9601 *et seq* o 52 FR 3748 (Feb 5, 1987)	The proposed standard for VO emissions from "product accumulator vessels" and leak detection programs, if finalized, will be relevant and appropriate to certain air stripping processes. This proposed standard is currently to be considered.
II. Clean Air Act (CAA) o 42 U.S.C. §§ 7401-7642 o 40 C.F.R. §§ 50-99 o CAA § 101	The substantive provisions of these regulations may be applicable to the air stripping tower. These regulations cover design standards, permitting requirements, modelling, control technology, air quality standards and hazardous constituents.
III. Mulford-Carrell Air Resources Act (CARA) o Cal. Health & Safety Code §§ 3900-44563 o Fresno County Air Pollution Control District, Regulation IV Prohibitory Rules	CARA meets the requirements of the federal CAA for state primacy. CARA is regulated by the Air Resources Board and enforced by the Fresno Air Pollution Control District. In addition, CARA establishes specific requirements, some of which are more stringent than the federal standards for a number of pollutant sources including toxic air contaminants. These regulations may be applicable to the air stripping tower.

Carbon Adsorption and Greensand--ARARs pertain to management and disposal of wastes generated in carbon and greensand processes.

Action	Comments
I. Resource Conservation and Recovery Act (as amended) (RCRA) o 42 U.S.C. § 6901 *et seq* o 40 C.F.R. §§ 261, 263, 264	If carbon or greensand wastes are taken offsite or managed onsite, RCRA requirements would be applicable if these wastes are designated as RCRA hazardous wastes. These regulations govern identification, generation, transport and disposal of hazardous waste.

Table 6
(Continued)

TREATMENT--GROUNDWATER

Carbon Adsorption and Greensand (Continued)

Action	Comments
II. (California) Hazardous Waste Control Act (HWCA) o Cal. Health & Safety Code §§ 25100-25395 o Cal. Admin. Code title 22, Chapter 30	The HWCA defines and controls hazardous wastes from generation to disposal. More stringent state regulations would be applicable to carbon or greensand wastes if they are state hazardous wastes.
III. (California) Porter-Cologne Water Quality Control Act o Cal Water Code § 13240 o Cal. Admin. Code, title 23, § 2520	The water quality objectives in the Basin Plan may be applicable to discharges (e.g., backwash water) from the greensand treatment process. Subchapter 15 requirements of title 23 are to be considered.
IV. Clean Water Act (CWA) o 33 U.S.C. §§ 1251-1376 o 40 C.F.R. § 403	For disposal to a POTW, the NPDES pretreatment requirements of the CWA may apply. NPDES requirements are administered under the Porter Cologne Act. The POTW would issue a permit for this discharge.

DISPOSAL--GROUNDWATER

Reinjection

Action	Comments
I. Safe Drinking Water Act (SDWA) o 42 U.S.C. § 300(f) <u>et seq</u> o 40 C.F.R. §§ 144, 146	EPA administers the program for Class I, III, IV, and V wells in California. Reinjection at the Purity site would constitute a Class V well, which currently is not covered under the UIC permitting program but is subject to the inventory provision of the UIC program. The inventory requirement is relevant and appropriate due to the technical value of the report information. The construction, operation and maintenance requirements for UIC wells are to be considered.

DISPOSAL--GROUNDWATER

Action	Comments
II. Cal. Water Code o §§ 13750-13755	The reporting requirement concerning well construction would be relevant and appropriate as it is one of the state's mechanisms for protection of water quality. Reports concerning construction, alteration or destruction of wells are filed with the Department of Water Resources.
III. Fresno County Ordinance o 470-A-39	This ordinance regulates the construction, alteration and abandonment of wells in Fresno County. The ordinance, being derived under state law, is applicable as a mechanism for protection of water quality.
IV. Safe Drinking Water Act (SDWA) o 42 U.S.C. 300(f) et seq o 40 C.F.R. § 142	The primary maximum contaminant levels (MCLs) of the SDWA are relevant and appropriate where groundwater may be a potential source of drinking water, whether or not it is considered a "community" supply. Federal MCLs would be relevant and appropriate requirements for reinjected water.
V. Department of Health (DHS) Action Levels for Public Drinking Water Supplies (January 1987)	Health-based numeric guidelines set by DHS for the protection of public drinking water supplies through nonpromulgated standards are the levels at which DHS requires water purveyors to take corrective action. These guidelines are to be considered.
VI. California Safe Drinking Water Act o Cal. Health and Safety Code §§ 4010-4037 o Cal. Admin. Code, title 22 §§ 64401 et seq	This Act provides for primacy of California with Federal SDWA and requires California to set maximum contaminant levels equal to or more stringent than Federal. California MCL's are relevant and appropriate requirements.

DISPOSAL--GROUNDWATER
Reinjection (Continued)

VII California Porter-Cologne Water Quality Control Act o Cal. Water Code § 13240	Requirements of the RWQCB Basin Plan 5(d) are applicable to reinjected water. Substantive and/or administrative requirments may apply depending on whether the wells are on or off-site.

North Central Canal/Infiltration Basin--Discharges of treated water to the North Central Canal or an infiltration basin would be required to meet the substantive and administrative requirements of applicable regulations.

Action	Comments
California Porter-Cologne Water Quality Control Act o Cal. Water Code § 13260	The North Central Canal is located in the Central Valley RWQCB Basin Planing Area 5(D). Requirements of that Water Quality Control Plan are applicable to discharges from the treatment system and would be regulated by the RWQCB through Waste Discharge Requirements.

ALTERNATIVE DRINKING WATER SOURCE

Public Drinking Water Supply

Action	Comments
I. Safe Drinking Water Act (SDWA) o 42 U.S.C. §300 (f) et seq o 40 C.F.R. §142	The primary maximum contaminant levels (MCLs) of the SDWA are applicable requirements.
II. Department of Health Services (DHS) Action Levels for Public Drinking Water Supplies (January 1987)	Health-based numeric guidelines set by DHS for the protection of public drinking water supplies through nonpromulgated standards are the level at which DHS requires water purveyors to take corrective action. These guidelines are to be considered.

Table 6
(Continued)

ALTERNATIVE DRINKING WATER SOURCE

Public Drinking Water Supply (Continued)

Action	Comments
III. California Safe Drinking Water Act o Cal. Health and Safety Code §§ 4010-4037 o Cal. Admin. Code, title 22 § 66401 *et seq*	This Act Provides for primacy of California with Federal SDWA and requires California to set maximum contaminant levels equal to or more stringent than Federal. These requirements are applicable.

INSTITUTIONAL CONTROLS

Monitoring Wells

Action	Comments
I. Cal. Water Code o §§ 13750-13755	The reporting requirement concerning well construction would be relevant and appropriate as it is one of the State's mechanisms for protection of water quality.
II. Fresno County Ordinance o 470-A-39	The ordinance regulates the construction, alteration and abandonment of wells in Fresno County. The ordinance, which is derived under the Cal. Water Code, is applicable as a mechanism for protection of water quality.

REMOVAL--TANKS

Action	Comments
I. Resource Conservation and Recovery Act, as amended (RCRA) o 42 U.S.C. § 6901 *et seq* o 40 C.F.R. §§ 261, 263 264, 268	If wastes are taken offsite or managed onsite RCRA requirements would be applicable, if wastes were RCRA hazardous wastes. Land disposal restrictions for TCLP are unknown at this time but may impact disposal. These requirements govern identification, generation, transport and disposal of hazardous wastes.

Table 6
(Continued)

REMOVAL--TANKS (Continued)

Action	Comments
II. Mulford-Carrell Air Resources Act (CARA) o Cal. Health & Safety Code §§ 3900-44563 o Fresno County Air Pollution Control District, Regulation IV Prohibitory Rules	CARA meets the requirements of the federal CAA for state primacy. In addition, CARA establishes specific requirements, some of which are more stringent than the federal standards, for toxic air contaminants. These regulations are aplicable. Before tank removal the Fresno Air Pollution Control District should be contacted regarding whether any actions related to the tank removal would fall under any federal or state air quality regulations.
III. (California) Hazardous Waste Control Act (HWCA) o Cal. Health and Safety Code §§ 25100-25395 o 22 CCR Chapter 30	The HWCA defines and controls hazardous wastes from generation to disposal. The Act provides no RCRA-type exemption for CERCLA sites. Therefore, more stringent regulations would be applicable to tank removal actions.
GENERAL ACTIONS	
Occupational Safety and Health Administration (OSHA) o 19 C.F.R. § 1910	OSHA requirements are applicable to worker exposures during response actions at CERCLA sites, except in states that enforce equivalent or more stringent requirements. California no longer has such a program for nongovernment employee workplace exposures.

potential transportation hazards. Short-term impacts of on-site storage would be due to any accidential release or possible exposure to trespassers.

LONG-TERM EFFECTIVENESS

In Alternative W2, only groundwater in the federal MCL area would be extracted and treated to remove organics, iron and manganese. Concentrations of 1,2-dichloroethane would continue to exceed the state MCL. Although the manganese levels would continue to exceed the EPA secondary MCLs in the state MCL area, they are not an identified public health risk.

In Alternative W2, the risk from ingestion of the groundwater in the state MCL area would be mitigated by providing an alternate water supply to the currently affected private well users. However, the untreated groundwater in the state MCL area would continue to move downgradient toward currently unaffected private and municipal wells. In Alternative W3, the groundwater in the state MCL area would be extracted and treated for removal of volatile organic compounds, iron and manganese. The future risk to downgradient water users would be controlled. In Alternative W3, the water users in the state MCL area would also be supplied with an alternate water source until remediation is achieved.

The types of long-term controls would be similar for Alternatives W2 and W3 and would include continued operation of the groundwater treatment facilities, monitoring of the groundwater and creation of a groundwater management zone to control pumping. Alternative W2 would require periodic sampling of approximately 20 monitoring wells, and Alternative W3 would require sampling of approximately 40 monitoring wells. The need for long-term institutional controls would be greater under W2, since use of the unremediated portions of the plume would have to be controlled to prevent exposure.

Both of the tank removal alternatives provide an effective long-term solution to the tank problem. Due to the relatively small volume of wastes (121.3 cy) an off-site disposal facility could effectively manage these wastes. Consolidation of these wastes with on-site soils would also be an effective long-term solution.

REDUCTION OF TOXICITY, MOBILITY OR VOLUME

In Alternative W2, 450 gpm of groundwater would be extracted from the federal MCL area and treated. In Alternative W3, 1,450 gpm of groundwater from the entire plume area would be extracted and treated. The treatment facilities for each alternative would remove approximately 99 percent of the organics and 90 percent of the iron and manganese.

Alternative W2 would reduce the toxicity, mobility or volume of contaminants in the groundwater where concentrations exceed the federal MCLs. Alternative W2 would not affect the toxicity, mobility or volume of the contaminants beyond the federal MCL area, where concentrations exceed the state MCL for 1,2-DCA. Alternative W3 would provide a greater reduction in the toxicity, mobility and volume of contaminants, that are chemical-specific ARARs for the site.

For the tanks, the selected remedy, off-site disposal of waste would not reduce the toxicity, mobility or volume (TMV) of the contaminants. Storage on-site and eventual treatment would achieve TMV reduction. However, this is weighted against the risk of on-site storage of hazardous waste until treatment can occur.

IMPLEMENTABILITY

The technical and administrative feasibility of implementing Alternatives W2 and W3 would be similar. Alternative W3 would be slightly more difficult to implement because more extraction wells and related piping would be required. The additional wells would require additional remedial design studies and additional construction. Since more extraction wells are required in Alternative W3, obtaining access to private property to install the wells and crossing the railroad right of way would be more involved.

The technical and administrative requirements for implementing the water disposal options would be similar for Alternatives W2 and W3. Depending upon the disposal option selected, each alternative would need to meet the same requirements. However, the disposal options for Alternative W3 would be slightly more difficult to implement since the volume of groundwater treated would be larger. Services and materials would be available to implement the disposal options for both of the alternatives.

Both tank alternatives would be feasible. On-site storage would require compliance with substantive requirements governing proper storage of hazardous waste and off-site disposal will require acceptance of waste by the permitted facility. If required by land ban, the waste may need pretreatment by solidification, prior to disposal.

COMPLIANCE WITH ARARs

Alternative W2 would not comply with all chemical-specific ARARs. Since this alternative was developed, the State of California has promulgated an MCL for 1,2-DCA of 0.5 ppb. Therefore, W2 would not comply with this new drinking water standard ARAR. Alternative W2 would also not comply with all state action levels if they are TBC ARARs for the site. Alternative W3 would comply with all chemical-, location-, and action-specific ARARs and would comply with state action levels, except for phenol. Both tank removal alternatives would be designed to meet ARARs for generation, transportation and disposal of hazardous waste.

COSTS

The present worth capital, operation and maintenance cost of W3 ($11,160,000) is approximately twice the cost of W2 ($6,420,000), while the flow rate for the W3 area (1,450 gpm) is approximately three times the W2 area (450 gpm). The O&M costs follow the same pattern, at $3,620,000 for W2 and $6,960,000 for W3. Cost of removing the steel tanks is estimated to be approximately $500,000. Offsite disposal of tank wastes would likely be less costly than onsite storage in a RCRA consistent manner.

OVERALL PROTECTION

Alternative W2 would provide a high degree of overall protection, but some risks would remain. Extraction and treatment of the groundwater in the federal MCL area would address the risks from ingestion of contaminated groundwater in that area. Connection of the water users located northwest of the site to an alternate water supply would mitigate the risks from ingestion of the groundwater in the private wells north of the federal MCL area. The risk of the contaminated groundwater in the state MCL area migrating to the northwest would remain.

Alternative W3 would provide a higher degree of overall protection. Extraction and treatment of the groundwater in the state MCL area would address the risks of ingestion of contaminated groundwater for the entire plume area. Connection of the water users located northwest of the site to an alternate water supply would address the risk of ingestion of the groundwater during implementation of the alternative. Alternative W3 would also inhibit migration of the contaminants to the northwest.

Removal of the steel tanks, and disposal of the tank wastes would eliminate a public health hazard and nuisance. In the short-term greater protection will be achieved by disposing of tank wastes off-site, rather than awaiting soil remediation for their disposition.

STATE AND COMMUNITY ACCEPTANCE

Both the State of California Department of Health Services and the Central Valley Regional Water Quality Control Board have submitted letters to EPA supporting the remedies selected in this ROD. Significant community input was not received during the public comment period. Opposition was not raised by community members to implementation of the proposed groundwater and tank cleanup alternatives. Concerns were raised that whatever remedy was selected should be protective of the community, both in the short-term and long-term and that the community should be kept informed on an ongoing basis of project developments. Public and state comment on the Feasibility Study and Proposed Plan are included in the Responsiveness Summary.

XII. THE SELECTED REMEDY

GROUNDWATER TREATMENT

The selected remedy (W3) for treating groundwater will use extraction and air stripping to meet drinking water standards for VOCs. Also, to meet secondary drinking water standards (taste and odor), a filtration process known as greensand would be used to remove iron and manganese from the water. The private well users located northwest of the site, whose wells have been affected, would be provided with an alternate water supply.

Institutional methods to control pumping will be implemented, and groundwater quality will be monitored over time to ensure that the remedy is effective. The effectiveness of this remedy is dependent on a soil cleanup remedy to be proposed in a forthcoming ROD.

Three different disposal options for the treated groundwater are being considered: reinjecting the treated water into the groundwater; discharging the water to the North Central Canal; or pumping the treated water to nearby infiltration basins. Coordination with state and local water agencies will take place to ensure that the selected disposal method(s) are consistent with local water management goals.

The entire clean-up operation is expected to take between 10 and 20 years to complete. The total cost would be approximately $11 million.

REMOVAL OF STEEL TANKS

The seven large, above-ground steel tanks currently on the site will be removed. The contaminated waste in the tanks will first be removed and disposed of at an EPA-approved hazardous waste facility, with prior treatment by solidification, if necessary. The tanks would then be cleaned, dismantled and transported off-site to an approved landfill or scrapyard, as appropriate. The total cost for this action is approximately $500,000.

XIII. STATUTORY DETERMINATIONS

PROTECTIVENESS

The goal of the selected remedy for groundwater is to clean up the aquifer to achieve federal and state drinking water standards and state action levels. Until cleanup is achieved, users of private wells affected by site contaminants will be provided with an alternate water supply. The air stripper will be supplied with a carbon adsorption system, if needed, to control VOC discharges to the atmosphere. Extracted water will be treated to meet whatever federal and state standards govern the particular type of discharge. A monitoring network will assume that groundwater cleanup goals are met in the long-term. Therefore, protection of human health and the environment will be achieved. Removal of the above-ground tanks will eliminate a public health hazard and nuisance at the site.

It is not expected that any unacceptable short-term or cross-media impacts will be caused by implementation of this remedy. Dust and noise control measures would be implemented during construction of the groundwater treatment facilities and tank removal activities.

ENVIRONMENTAL IMPACTS

No significant environmental impacts are expected during construction of this alternative. The only construction includes the groundwater treatment facilities, monitoring and extraction wells, associated piping, alternate water supply facilities and tank removal. Dust control measures would be implemented during construction. Air emissions from the groundwater treatment process would be discharged through an activated carbon process if needed, to reduce volatile organic compounds discharged to the atmosphere. Reinjection of the treated water or disposal within the extraction area would help mitigate the impact of watertable drawdown.

COMPLIANCE WITH ARARS

Alternative W3 would comply with all chemical-, location-, and action-specific ARARs identified for the site, except the SAL for phenol. If phenol is determined to be site related, based on additional sampling, addition of an aqueous-phase carbon adsorption system may be required if the phenol SAL was considered to be an ARAR.

COST-EFFECTIVENESS

No other alternative to pumping and treating groundwater provides long-term protectiveness. The selected remedy at $11,160,000 is required to meet ARARs for groundwater cleanup.

USE OF PERMANENT SOLUTIONS AND ALTERNATIVE TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized. The proposed air stripping/greensand system employs treatment that will result in a permanent solution to the VOC, iron and manganese groundwater problems, if used in conjunction with a soil remedy.

Offsite disposal of tank waste will result in the need for long-term management at the receiving facility and would therefore not be considered use of a permanent solution to the maximum extent possible. However, the tank wastes constitute an only relatively small volume (121.3 cy) of the over 100,000 cy of site soils for which a permanent remedy is being evaluated through treatability studies.

THE PREFERENCE FOR TREATMENT

The SARA preference for treatment is met by the greensand/air stripping groundwater treatment alternative. VOC's, iron and manganese would be removed from the groundwater with the goal of restoring the aquifer to drinking water standards and action levels. Used in conjunction with a source control remedy, this would eliminate the principal groundwater threat at the site.

Offsite disposal of tank waste would not meet the SARA preference for treatment. The SARA preference for treatment for the rest of the site soils and waste will be addressed in the future soils ROD.